



# Massachusetts Guidelines for Adult Diabetes Care

DIABETES  
GUIDELINES  
WORK GROUP

DIABETES  
PREVENTION  
AND CONTROL  
PROGRAM



*Working together for  
prevention and control*

Massachusetts Department of Public Health

*Developed 1999  
Revised 2001, 2003, 2005*

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Dear Colleague:

The Diabetes Prevention and Control Program of the Massachusetts Department of Public Health and members of the Diabetes Guidelines Work Group are pleased to provide you with the latest update to the Massachusetts Guidelines for Adult Diabetes Care, based on the American Diabetes Association 2005 Clinical Practice Recommendations. First created in 1999 and revised in 2001 and 2003, our initial goals were to develop uniform guidelines that apply to adults with diabetes regardless of insurer, to help eliminate any confusion brought about by differences in guidelines disseminated by individual third party payers, and to assist health care professionals in systematizing the care provided to people with diabetes. Many organizations working together created and updated a document that we hope is user-friendly and will serve as a valuable tool to improve diabetes care in the state.

### Revisions

The 2005 revisions to the Guidelines include:

- Updated definition of IFG
- Addition of a new section, *Prevention or Delay of Type 2 Diabetes*
- Addition of a new section, *Other Guidelines to Consider: Psychosocial Issues, Retinopathy, and Periodontal Disease*
- Updated Cardiovascular section to include the latest NHLBI Cholesterol Guidelines
- Addition of a Lipid Lowering Decision Tree and updated recommendation on lipid management based on recent studies
- Addition of a new very short-acting insulin to the insulin table
- Addition of incretin mimetics to the medication section under *Other Medications*

### Partners

The Guidelines are a collaborative effort among many partners:

Baystate Health System	MassPRO
Blue Cross Blue Shield of Massachusetts	Neighborhood Health Plan
Boston Medical Center HealthNet Plan	Network Health
Fallon Community Health Plan	Partners/MGH
Harvard Pilgrim Health Care	Primary Care Clinician (PCC) Plan
Massachusetts Department of Public Health	Tufts Health Plan
Massachusetts League of Community Health Centers	University of Massachusetts, Amherst
Massachusetts Medical Society	

### Additional Information

- The Guidelines are available at [www.mass.gov/dph/fch/diabetes](http://www.mass.gov/dph/fch/diabetes) on the MDPH website.
- You may order additional copies of the Patient Care Card and the laminated Guidelines Summary free of charge from the Massachusetts Health Promotion Clearinghouse (order form enclosed).
- If you have questions about the Guidelines, please call the Massachusetts Diabetes Prevention and Control Program at (617) 624-5070.

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Please join us in our efforts to reduce the burden of diabetes in Massachusetts by reviewing the enclosed Guidelines, and applying these key recommendations to your practice.

Sincerely,



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Massachusetts Department of Public Health



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# INTRODUCTION TO THE MASSACHUSETTS GUIDELINES FOR ADULT DIABETES CARE

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Both national studies and state data indicate that people with diabetes do not receive recommended levels of preventive care, leaving wide gaps between current recommendations and actual practice. The Massachusetts Guidelines for Adult Diabetes Care were developed as an opportunity to improve diabetes care in the state. The Guidelines highlight and summarize essential components of quality diabetes management, and offer accompanying tools for use in the primary care setting. These Guidelines are not intended to replace the clinical judgement of primary care providers, nor are they intended to preclude more extensive evaluation and management of the patient by other specialists as needed.

The Guidelines were developed by a Work Group convened by the Massachusetts Department of Public Health Diabetes Prevention and Control Program and its Advisory Board. The Work Group was comprised of clinicians, representatives from Managed Care Organizations, the Primary Care Clinician Plan, the Massachusetts League of Community Health Centers, the Massachusetts Medical Society, and MassPRO. Their recommendations were incorporated into the final version. The Guidelines are reviewed and revised on a regular basis.

The Guidelines are a cooperative effort among many partners. This unique collaboration eliminates the confusion brought about by slight differences in guidelines developed by each managed care organization. These Guidelines, though based on the American Diabetes Association's (ADA) Clinical Practice Recommendations, are not intended to serve as a description of benefits or coverage; coverage may vary by insurer.

## Diagnosis and Classification of Diabetes Mellitus

New recommendations for the diagnosis, screening, and classification of diabetes were developed in 1997 and updated in 2003 with a follow up report by an international expert committee working under the sponsorship of the American Diabetes Association. The report's recommendations have been accepted and are supported by the American Diabetes Association, the Division of Diabetes Translation of the Centers for Disease Control and Prevention, and the National Institute of Diabetes and Digestive and Kidney Diseases of the National Institutes of Health.

## Guidelines for Adult Diabetes Care (laminated summary)

This summary of the Guidelines highlights basic medical care for people with diabetes. We suggest you post them in each exam room as a reminder of recommendations for care.

## Prevention or Delay of Type 2 Diabetes

There is now substantial evidence that type 2 diabetes can be prevented or delayed. This section includes information on the benefits of weight loss and physical activity for overweight or sedentary patients.

## Diabetes Medications

This provides an overview of oral diabetes medications, insulin, and other medications including information on dosage, onset, duration,

drug interactions, and contraindications. The section on treatment approach principles provides information to assist with treatment decision-making in type 2 diabetes. A chart comparing various oral antidiabetic agents is located on page 13.

## Flow Sheet for Diabetes Care

The flow sheet reflects the recommendations found on the Guidelines for Adult Diabetes Care laminated summary. It can be copied or modified for use in your practice and included in patients' charts. Diabetes medications, exams, and test results can be documented over time to track diabetes management.

## Cardiovascular Risk Reduction Guidelines

Adults with diabetes are two to four times more likely to have coronary heart disease than those without diabetes. Treatment of diabetic dyslipidemia is critical, as is the prevention and treatment of other cardiovascular risk factors such as high blood pressure, excess weight, smoking, and lack of physical activity. These Guidelines contain summaries of cholesterol lowering therapy, ACE inhibitor therapy, and aspirin use, as well as a smoking intervention model. A new *Lipid Lowering Decision Tree in Type 2 Diabetes* has been added.

## Hypertension

Hypertension contributes to the development and progression of chronic complications of diabetes. Aggressive treatment of even mild-to-moderate hypertension is beneficial. This guideline includes information on progressive goals for hypertension management.

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# INTRODUCTION TO THE MASSACHUSETTS GUIDELINES FOR ADULT DIABETES CARE

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## Diabetic Nephropathy Guidelines

Diabetes is the leading cause of end-stage renal disease, accounting for about 40% of new cases. Intensive diabetes therapy can significantly reduce the risk of the development of microalbuminuria and overt nephropathy in people with diabetes. Annual screening for microalbuminuria will allow early identification of patients with nephropathy. Improving glycemic control, aggressive antihypertensive treatment, and the use of ACE inhibitors will slow the progression of nephropathy. These Guidelines contain information on screening for albuminuria and hypertension control.

## Smoking Intervention Model

Only about half the smokers with diabetes have been advised to quit smoking by their health care providers. This section includes screening and treatment recommendations, as well as resources and a tool, that provide a staged format for counseling patients who smoke.

## Foot Inspection and Monofilament Use Guide

Foot ulcers and amputations are a major cause of morbidity, disability, and expense for people with diabetes. Early recognition and management of risk factors for ulcers and amputations can delay the onset of these adverse outcomes. This guide highlights key points of the foot exam, monofilament test, and use of a tuning fork.

## Medical Nutrition Therapy and Diabetes Self-Management Training Summary

Medical nutrition therapy and diabetes self-management training are integral to successful diabetes care and management. This provides the person with diabetes with the knowledge and skills to perform self-care on a day-to-day basis to achieve and maintain optimal glucose control. Numerous studies have demonstrated that self-management training leads to reductions in costs associated with diabetes. This summary lists topics to include in both basic and continuing education for medical nutrition therapy and diabetes self-management training.

## Other Guidelines to Consider

Psychosocial issues may prevent patients with diabetes from adhering to the recommended medical regime. This guideline discusses incorporating psychosocial screening and treatment into routine care for people with diabetes.

Diabetic retinopathy is estimated to be the most frequent cause of new blindness among adults aged 20-74 years. Early diagnosis and treatment is beneficial in preventing visual loss for people with diabetes.

Almost one-third of people with diabetes has severe periodontal disease. Periodontal disease progresses more rapidly and is more difficult to treat in people with diabetes. Recent research suggests the presence of periodontal disease can negatively impact glycemic control. Including a routine oral exam as part of the yearly comprehensive visit, and encouraging patients to receive dental follow-up at least twice a year are among the recommendations.

## Determining Body Mass Index (BMI)

Obesity substantially raises the risk of morbidity from type 2 diabetes and other diseases. The BMI describes relative weight for height and is significantly correlated with total body fat content. The BMI may be used to assess overweight and obesity and to monitor changes in body weight.

## Diabetes Care Card (patient wallet card)

The Diabetes Care Card allows people with diabetes to track their diabetes care and personal goals. The wallet card has space to record test results and services received over four visits. Encourage your patients to bring this card to each office visit.

## Diabetes Resources

This information may now be found on the Massachusetts Department of Public Health web site  
[www.mass.gov/dph/fch/diabetes](http://www.mass.gov/dph/fch/diabetes)

## References

References for both the Guidelines and supporting materials are provided.

For additional copies of either the Guidelines or the Diabetes Care Card, order directly from the Massachusetts Health Promotion Clearinghouse website [www.maclclearinghouse.com](http://www.maclclearinghouse.com)

Electronic copies of all Guidelines materials as well as patient education materials and “The Burden of Diabetes in Massachusetts” are available on The Massachusetts Department of Public Health web site  
[www.mass.gov/dph/fch/diabetes](http://www.mass.gov/dph/fch/diabetes)

If you have questions about the Guidelines, please call the Massachusetts Diabetes Prevention and Control Program at (617) 624-5070.

## Criteria for Testing for Diabetes in Asymptomatic Adults

Testing for diabetes should be considered for all individuals age 45 and older, particularly in those with a BMI  $\geq 25\text{kg/m}^2$ , and, if normal, should be repeated at 3 year intervals. Testing should be considered at a younger age, or be carried out more frequently, in individuals who are overweight (BMI  $\geq 25\text{kg/m}^2$ )\* and have additional risk factors:

- Are habitually physically inactive
- Have a first-degree relative with diabetes
- Are members of a high-risk ethnic population (African-American, Hispanic, Native American, Asian-American, Pacific Islander)
- Have delivered a baby weighing  $>9$  lbs. or were diagnosed with Gestational Diabetes Mellitus
- Are hypertensive ( $\geq 140/90$  mmHg)
- Have an HDL cholesterol level  $\leq 35$  mg/dl and/or a triglyceride level  $\geq 250$  mg/dl
- Have polycystic ovary syndrome (PCOS)
- Had Impaired Glucose Tolerance (IGT) or Impaired Fasting Glucose (IFG) on previous testing
- Have other conditions associated with insulin resistance (acanthosis nigricans)
- Have a history of vascular disease

\*May not be applicable for all ethnic groups

The Fasting Plasma Glucose (FPG) is the preferred diagnostic test due to its ease of administration, convenience, acceptability to patients, and lower cost.

Source: American Diabetes Association (Position Statement). Standards of medical care for patients with diabetes. Diabetes Care 28 (Supplement 1): S6, 2005.

## Diagnostic Criteria for Diabetes

An FPG value  $\geq 126$  mg/dl (confirmed by testing on two different occasions) is diagnostic for diabetes. If the FPG is  $< 126$  and there is a high suspicion of diabetes, the OGTT may be performed. These criteria are for diagnosis and are not treatment criteria or goals.

**The hemoglobin A1c (A1C) is not recommended for diagnosis at this time.**

## Criteria for the Diagnosis of Diabetes in Non-Pregnant Adults

	Fasting Plasma Glucose (FPG) <sup>1</sup> (preferred)	Casual Plasma Glucose (CPG) <sup>2</sup>	Oral Glucose Tolerance Test (OGTT) <sup>3</sup>
<b>Diabetes Mellitus</b>	FPG $\geq 126$ mg/dl (7.0 mmol/l)	Casual Plasma Glucose $\geq 200$ mg/dl (11.1 mmol/l) plus symptoms of diabetes	Two hour plasma glucose (2hPG) $\geq 200$ mg/dl
<b>Prediabetes</b>	Impaired Fasting Glucose (IFG) FPG $\geq 100$ and $< 126$ mg/dl		Impaired Glucose Tolerance (IGT) 2hPG $\geq 140$ and $< 200$ mg/dl
<b>Normal</b>	FPG $< 100$ mg/dl		2hPG $< 140$ mg/dl

<sup>1</sup>The FPG is the preferred test for diagnosis, but any one of the three listed is acceptable. Fasting is defined as no caloric intake for at least 8 hours.

<sup>2</sup>Casual is defined as any time of day without regard to time since last meal. Symptoms are the classic ones of polyuria, polydipsia, and unexplained weight loss. There are currently no guidelines for interpreting CPG values that fall between 140-199 mg/dl. For values in this range, a follow-up FPG to rule out diabetes can be considered.

<sup>3</sup>OGTT should be performed using a glucose load containing the equivalent of 75 g anhydrous glucose dissolved in water. The OGTT is not recommended for routine clinical use, but may be necessary when evaluating patients with IFG or when diabetes is still suspected despite an FPG  $< 126$ .

Sources:

American Diabetes Association. Diagnosis and classification of diabetes mellitus. Diabetes Care 28 (Supplement 1): S37-S42, 2005.

American Diabetes Association (Position Statement). Standards of medical care for patients with diabetes mellitus. Diabetes Care 28 (Supplement 1): S4-S36, 2005.

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## Classification of Diabetes

### Type 1

Type 1 diabetes most often results from a cellular mediated autoimmune destruction of the beta cells of the pancreas. Patients with this form of diabetes are dependent upon insulin for survival and are at risk for ketoacidosis. Type 1 commonly occurs in childhood and adolescence but may occur at any age.

### Type 2

Individuals with type 2 diabetes have insulin resistance and relative, rather than absolute, insulin deficiency. Primary treatment centers on weight loss, improved nutrition, and increased age-appropriate physical activity. Oral agents may become necessary if the initial treatment is unsuccessful. These patients do not need insulin to survive but may require insulin over time for optimal management, especially if oral agents become ineffective. Type 2 diabetes commonly goes undiagnosed for years because it is often asymptomatic in its early stages. Individuals with undiagnosed type 2 diabetes are at increased risk for developing macro- and microvascular complications.

### IFG and IGT

Impaired Fasting Glucose (IFG) has been defined as a fasting plasma glucose of  $\geq 100$  mg/dl but  $< 126$  mg/dl. Impaired Glucose Tolerance (IGT) is defined as a 2 hour oral glucose tolerance test value of  $\geq 140$  mg/dl, but  $< 200$  mg/dl. Both IFG and IGT have been categorized as prediabetes and are risk factors for future diabetes and cardiovascular disease. Recent studies have shown that modest weight loss and regular physical activity can reduce the rate of progression of IGT to type 2 diabetes.

### GDM

Gestational Diabetes Mellitus (GDM), which typically occurs following the 24th week, is defined as any degree of glucose intolerance with onset or first recognition during pregnancy\*. The definition applies regardless of whether insulin or only dietary modification is used for treatment. GDM complicates approximately 4% of all pregnancies in the U.S.; however, the prevalence is higher among some minority groups. Six weeks or more after the pregnancy ends, a woman with GDM should be tested to rule out type 1 or 2 diabetes or IFG/IGT. Women with GDM have a higher risk for type 2 diabetes later in life.

\* Hyperglycemia occurring during the early part of pregnancy is generally indicative of type 1 diabetes or undiagnosed type 2 diabetes.

Source: American Diabetes Association (Position Statement). *Diagnosis and classification of diabetes mellitus. Diabetes Care 28 (Supplement 1): S37-S42, 2005.*

### Goals for Glycemic Control\*\*

	Normal	Goal
<b>Preprandial Plasma Glucose</b>	<100 mg/dl	90-130 mg/dl
<b>Peak Postprandial Plasma Glucose</b>	<120 mg/dl	<180 mg/dl
<b>Hemoglobin A1C</b>	<6%	<7%**

\*\* More stringent goals, including a normal A1C of  $< 6\%$ , can be considered in individual patients and during pregnancy.

### Points to remember when setting glycemic goals:

- Individualize goals.
- Target postprandial glucose if A1C values are not optimal and preprandial glucose goals are met.
- A lower A1C is associated with lower rates of microvascular complications as well as myocardial infarction and cardiac death, however there is a greater risk of hypoglycemia.<sup>1</sup>
- Patients with frequent or severe hypoglycemia may require less intensive glycemic goals.
- Children, pregnant women, and elderly individuals require special considerations when setting glycemic goals.

Source: American Diabetes Association (Position Statement). *Standards of medical care for patients with diabetes mellitus. Diabetes Care 28 (Supplement 1): S10-S1, 2005.*

<sup>1</sup>Stratton IM, Adler AI, Neil HAW, et al. Association of glycaemia with macrovascular and microvascular complications of type 2 diabetes (UKPDS 35): Prospective observational study. *BMJ*: 321:405-412, 2000.

### Summary

Hyperglycemia that does not meet the diagnostic criteria for diabetes is referred to as Impaired Fasting Glucose, (IFG) or Impaired Glucose Tolerance (IGT).

IFG	Fasting blood glucose	100 mg/dl–125 mg/dl
IGT	2 hour value	140 mg/dl–199 mg/dl

During the last 10 years, five well designed randomized controlled studies\* have evaluated the effect of various lifestyle modification strategies and/or utilization of glucose-lowering drugs to prevent or delay the onset of type 2 diabetes. The results of these studies clearly demonstrate that patients at high risk for diabetes can be identified early in the disease progression, prior to exhibiting blood glucose values diagnostic for diabetes. It is also evident that type 2 diabetes can be delayed and possibly prevented.

In these prevention trials, lifestyle modification using low calorie, low fat diets and increased physical activity (generally 150 minutes per week) resulted in a 5-10% weight loss. These lifestyle approaches successfully and consistently prevented the onset of diabetes. In the Diabetes Prevention Program, the lifestyle intervention was nearly twice as effective as a glucose lowering medication (metformin) in preventing the onset of diabetes among persons with elevated fasting and post-load plasma glucose levels. Overall, the data suggest that lifestyle modification should be the first treatment modality to employ in persons at high risk. Such interventions also provide a variety of other health benefits in addition to delaying diabetes. Further studies are underway to evaluate the cost-effectiveness of intervention. At this time however, the known financial burden resulting from diabetic complications suggests that an attempt to prevent diabetes is worthwhile. Health care providers are encouraged to stress the benefits of weight loss and physical activity for overweight or sedentary patients at every opportunity.

### Screening Recommendations

Screen patients who are at high risk for diabetes:

- Age  $\geq 45$
- BMI  $\geq 25$  kg/m<sup>2</sup> (BMI  $\geq 23$  kg/m<sup>2</sup> for Asian individuals)
- 1st degree relative with diabetes
- Habitual physical inactivity
- African-American, Hispanic, Native American, Asian American, Pacific Islander
- History of gestational diabetes or delivering a baby weighing  $>9$  lbs
- History of hypertension ( $\geq 140/90$  mmHg)
- HDL cholesterol level  $\leq 35$  mg/dl and/or a triglyceride level  $\geq 250$  mg/dl
- Polycystic ovary syndrome
- Acanthosis nigricans
- History of vascular disease

### Testing

- Use either the fasting blood glucose test (FBG) or the 2 hour oral glucose tolerance test.
- The FBG test is preferred due to convenience, lower cost, and ease of administration.
- In those positive for IFG or IGT, screen for additional cardiovascular disease risk factors (e.g., tobacco use, hypertension, dyslipidemia). Provide treatment as appropriate.

### Treatment

- Refer patients with IGT or IFG for medical nutrition therapy for counseling on weight loss, as well as instruction for increasing physical activity.
- Provide for follow-up weight loss and physical activity counseling.
- Monitor for the development of diabetes every 1-2 years.

### Lifestyle Modifications

- Individuals at high risk for developing diabetes need to become aware of the benefits of modest weight loss and participating in regular physical activity.

### Pharmacological

- Drug therapy should not be routinely used to prevent diabetes until more information is known about its cost effectiveness.

Sources:

\* *Finnish Study*

Tuomilehto J, Lindstrom J, Eriksson JG, Valle TT, Hamalainen H, Ilanne-Parikka P, Keinanen-Kiukkaanniemi S, Laakso M, Louheranta A, Rastas M, Salminen V, Uusitupa M. Prevention of type 2 diabetes mellitus by changes in lifestyle among subjects with impaired glucose tolerance. *N Engl J Med* 344:1343-1350, 2001.

\* *Diabetes Prevention Program (DPP)*

Knowler WC, Barrett-Connor E, Fowler SE, Hamman RF, Lachin JM, Walker EA, Nathan DM. Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. *N Engl J Med* 346: 393-403, 2002.

\* *DaQing Study*

Pan XR, Li GW, Hu YH, Wang JX, Yang WY, An ZX, Hu ZX, Lin J, Xiao JZ, Cao HB, Liu PA, Jiang XG, Jiang YY, Wang JP, Zheng H, Zhang H, Bennett PH, Howard BV. Effects of diet and exercise in preventing NIDDM in people with impaired glucose tolerance: The Da Qing IGT and diabetes study. *Diabetes Care* 20:537-544, 1997.

\* *Troglitazone in Prevention of Diabetes Study (TRIPOD)*

Buchanan TA, Xiang AH, Peters RK, Kjos SL, Marroquin A, Goico J, Ochoa C, Tan S, Berkowitz K, Hodis HN, Azen SP. Preservation of pancreatic beta cell function and prevention of type 2 diabetes by pharmacological treatment of insulin resistance in high-risk hispanic women. *Diabetes* 51:2796-2803, 2002.

\* *STOP-NIDDM study*

Chiasson JL, Josse RG, Gomis R, Hanefeld M, Karasik A, Laakso M. Acarbose for prevention of type 2 diabetes mellitus: The STOP-NIDDM randomized trial. *Lancet* 359:2072-2077, 2002.

## TYPE 2 DIABETES TREATMENT APPROACH PRINCIPLES

Optimal treatment for type 2 diabetes incorporates a multiple risk factor approach including self-management counseling, medical nutrition therapy, physical activity, weight reduction if appropriate, and the use of oral glucose lowering agents or insulin if necessary. Careful consideration needs to be given to ameliorating associated cardiovascular risk factors such as hypertension, smoking, and dyslipidemia.

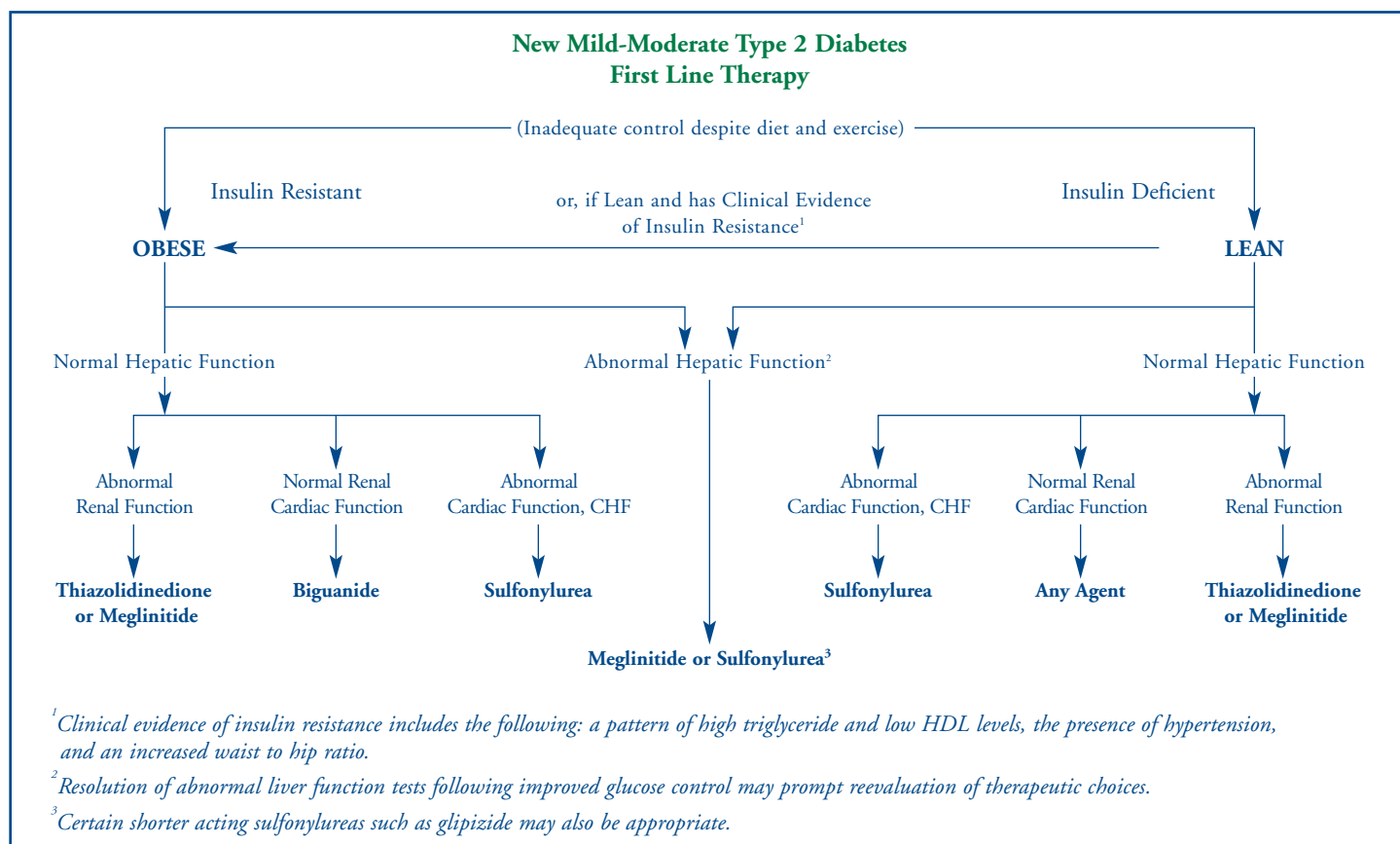
When setting treatment goals for individuals with type 2 diabetes, it is important to assess the risk for severe hypoglycemia and consider the person's ability to comprehend the regimen. Consider as well other factors that may optimize or minimize the treatment's benefit including: advanced age, end-stage renal disease (ESRD), advanced cardiovascular or cerebrovascular disease, or other co-morbidities that may lead to reduced life span.

Achievement of normal or near normal blood glucose levels requires education in self-management techniques including:

- Self monitoring of blood glucose
- Recognition, treatment, and prevention of hypoglycemia
- Prevention, early detection, and treatment of chronic complications
- Medical nutrition therapy
- Regular physical activity
- Reinforcement and continuing education

For individuals who have been unable to achieve optimal blood glucose control through dietary changes and regular physical activity, the use of a single antidiabetic oral agent is recommended. *Sulfonylureas, metformin, meglitinides, alpha glucosidase inhibitors, and thiazolidinediones* are all approved by the FDA for monotherapy. The choice of a particular agent must depend, however, on the individual's characteristics. Appropriate diet and exercise should be maintained even if the diabetes is being managed pharmacologically.

The following is a guideline to assist in the choice of a pharmaceutical agent. Care must be individualized based on patient characteristics and physician preferences. This suggested treatment approach reflects current thinking; however, changes will continue to be made in this recommended algorithm. A chart comparing the attributes of the various oral antidiabetic medications is located on page 13.



## TYPE 2 DIABETES TREATMENT APPROACH PRINCIPLES

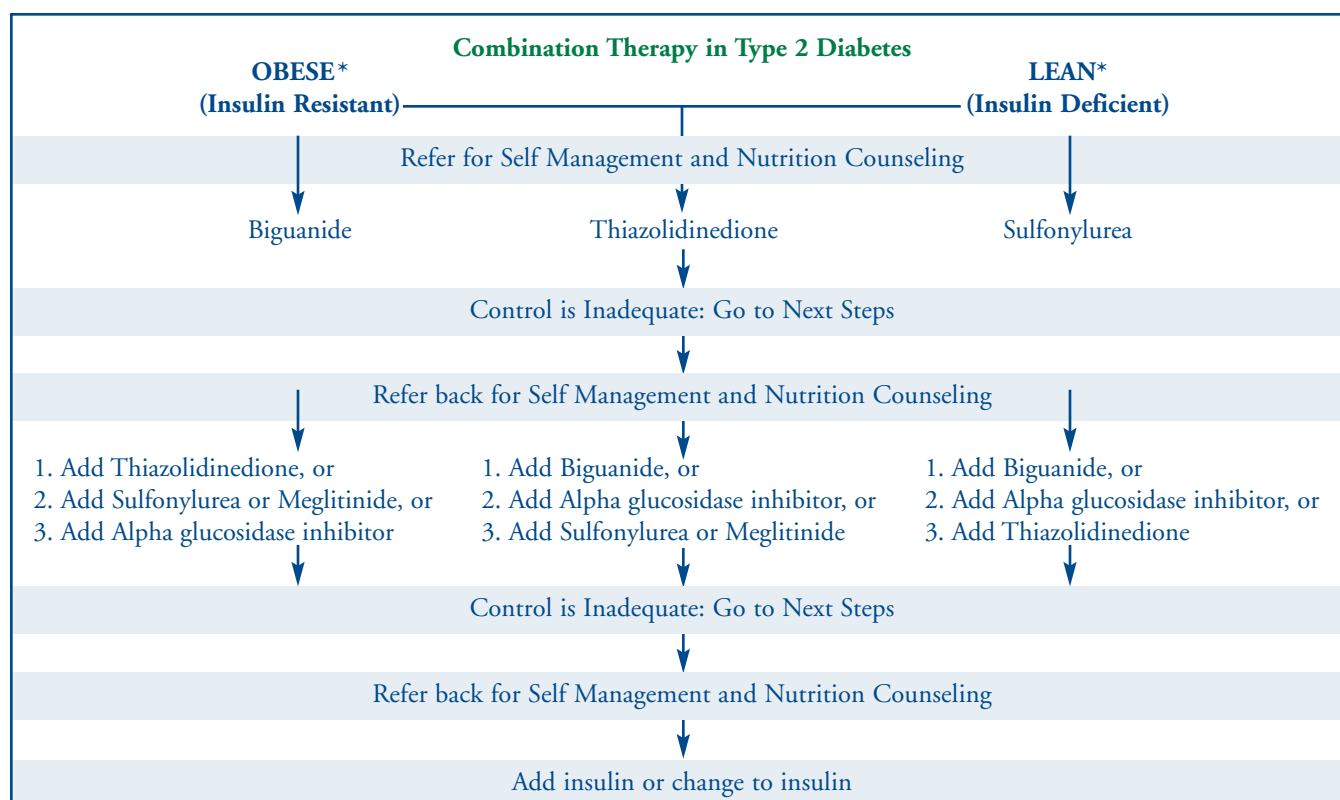
In case of monotherapy failure, combination therapies may be attempted. If, despite the use of oral agent combination therapy glycemic control is not achieved or maintained, insulin must be used, either alone or in combination with an indicated oral drug regimen. The total daily insulin doses range from 0.4-1.2 U/kg/day. For insulin resistant patients, doses of >1.5 U/kg/day may be required.

Choice of specific agents should be based on self-monitoring of blood glucose (SMBG) profiles and physician preference. Remember to evaluate the patient's cardiac, renal, and hepatic function as appropriate for each oral agent. The choice of an additional agent depends on the patient's SMBG patterns and clinical scenario. For information comparing the oral antidiabetic agents, refer to the table on page 13.

There are several recent or ongoing clinical trials comparing the effect of combining a thiazolidinedione with metformin and/or a sulfonylurea. From a clinical perspective, these studies suggest a relatively small difference in glucose control for any particular two-combination regimen. The adverse effect of a particular course of therapy may determine which combination regimen is chosen for a specific patient. Individual concerns over hypoglycemia, GI side effects, or edema may "tip the scale" away from one permutation towards another.

Possible considerations for selecting various combination regimens include:

- Adding a thiazolidinedione to current therapy may be helpful in patients with high triglycerides and low HDL
- Adding metformin may be helpful in patients with an elevated LDL
- Adding a meglitinide may be helpful if post-prandial glucoses are elevated
- Combining a thiazolidinedione with metformin may be helpful in patients with albuminuria
- Weight gain may increase when adding a thiazolidinedione and sulfonylurea together
- Meglitinide therapy improves post-prandial glucose control when added to metformin
- Meglitinide therapy combined with an alpha glucosidase inhibitor could potentiate risk for post-prandial hypoglycemia
- Metformin therapy combined with an alpha-glucosidase inhibitor could potentiate gastrointestinal side effects



\*Obese = BMI>30, Lean = BMI<25

## ORAL MEDICATIONS

CLASS	GENERIC NAME STRENGTH	TRADE NAME	DOSEAGE (mg) (total daily)	COMMENTS
First Generation Sulfonylureas <sup>1</sup>	tolbutamide 500 mg	Orinase	500-3000	<i>Regular testing of blood glucose and A1C is recommended to assess medication effect.</i> All sulfonylureas may cause hypoglycemia. Least potent. Short half-life, useful in renal disease.
	chlorpropamide 100, 250 mg	Diabinese	100-500	Longest duration. Caution with elders with renal disease. Alcohol may cause Antabuse-like reaction. Chlorpropamide can cause hyponatremia.
	tolazamide 100, 250, 500 mg	Tolinase	100-1000	Essentially no advantage over tolbutamide.
	acetohexamide 250, 500 mg	Dymelor	250-1500	Essentially no advantage over tolbutamide.
Second Generation Sulfonylureas <sup>1</sup>	glipizide 5, 10 mg	Glucotrol	2.5-40	Take on an empty stomach. Lowest incidence of hypoglycemia. No Antabuse-like reaction. Dosage twice daily.
	glipizide extended release 2.5, 5, 10 mg	Glucotrol XL	5-20	Extended-release dosage form of glipizide, allows the therapeutic benefit to last for 24 hours. Low toxicity. Useful in renal dysfunction. Dosage once daily. Consider splitting large doses twice daily.
	glipizide/metformin 2.5/250 mg, 2.5/500 mg 5/500 mg	Metaglip	2.5/250-20/2000	See entry for glyburide/metformin below.
	glyburide 1.25, 2.5, 5 mg	Micronase, Diabeta	1.25-20	No Antabuse-like reaction. Low toxicity. Dosage once daily with breakfast or the first main meal.
	glyburide (micronized) 1.5, 3, 6 mg	Glynase PresTab	0.75-12	No advantage over the nonmicronized products. Dosage once daily with breakfast or the first main meal.
	glyburide/metformin 1.25/250 mg 2.5/500 mg 5/500 mg	Glucovance	1.25/250- 20/2000	Sulfonylurea/metformin combinations can be used as initial or second line therapy. Titrate slowly. Administer with food. May cause hypoglycemia. Major side effects are GI symptoms. Lactic acidosis may occur, therefore it is contraindicated in patients with renal insufficiency, chronic metabolic acidosis, or CHF. Temporarily discontinue for surgery or for radiology procedures involving contrast media.
Meglitinides	glimepiride 1, 2, 4 mg	Amaryl	1-8	Dosage once daily.
	repaglinide 0.5, 1, 2 mg	Prandin	1-16	Similar mechanism of action with the sulfonylureas (insulinotropic). May be used as monotherapy or in combination with metformin or a thiazolidinedione. Must be taken before meals, within 15 to 30 minutes of the meal. Patients who skip or add a meal should be instructed to skip or add a dose for that meal. May cause hypoglycemia.
	nateglinide 60, 120 mg	Starlix	180-360	Similar mechanism of action with the sulfonylureas (insulinotropic). Indicated as primary treatment, either as monotherapy or in combination with metformin. Use with caution in chronic liver disease. Dosage 3 times daily, 1 to 30 minutes before meals. May cause hypoglycemia. Patients who skip a meal should also skip that dose of nateglinide to reduce the risk of hypoglycemia. Should not be added to regimens of patients who have not been adequately controlled by glyburide or other insulin secretagogues, nor should these patients be switched to nateglinide.

(continued on reverse)

## ORAL MEDICATIONS

CLASS	GENERIC NAME STRENGTH	TRADE NAME	DOSEAGE (mg) (total daily)	COMMENTS
Alpha Glucosidase Inhibitors	acarbose 25, 50, 100 mg	Precose	25-300	Regular testing of blood glucose and A1C is recommended to assess medication effect.  Delays absorption of starch after a meal. Take with first bite of food. When used as a monotherapy, does not cause hypoglycemia. Most common side effect is excessive flatulence, diarrhea, and abdominal pain. Initiate medication slowly to decrease GI effects. Contraindicated in DKA, inflammatory bowel disease, colonic ulceration, or partial intestinal obstruction. If hypoglycemia occurs in patients who are being treated with either Precose or Glyset as well as either insulin or sulfonylureas, it MUST be treated with glucose, not sucrose or complex carbohydrates.
	miglitol 25, 50, 100 mg	Glyset	25-300	
Biguanides	metformin 500, 850, 1000 mg	Glucophage	1000-2550	Decreases hepatic glucose production and increases insulin sensitivity, not insulin production; therefore, hypoglycemia is not a side effect if metformin is used as monotherapy. Take with food to lessen gastrointestinal side effects. Do not use with impaired renal or hepatic function. D/C for surgical and IV contrast dye procedures.
	metformin extended release 500 mg	Glucophage XR	500-2000	
	glyburide/metformin 1.25/250 mg, 2.5/500 mg, 5/500 mg	Glucovance	1.25/250- 20/2000	See entry under second generation sulfonylureas.
	glipizide/metformin 2.5/250 mg, 2.5/500 mg 5/500 mg	Metaglip	2.5/250-20/2000	See entry under second generation sulfonylureas.
Thiazolidinediones <sup>1</sup>	rosiglitazone/metformin 1/500 mg, 2/500 mg, 4/500 mg	Avandamet	4/1000-8/2000	Increases peripheral and hepatic sensitivity to insulin. Both pioglitazone and rosiglitazone are approved for use as single agents or in combination with insulin, metformin, or sulfonylureas. Neither pioglitazone nor rosiglitazone causes hypoglycemia when used as monotherapy. May be administered without regard to food. Monitor for symptoms and signs of congestive heart failure at 6 weeks and 3 months.  <b>Precaution:</b> Use with caution in the presence of hepatic disease. Do not use with patients who have discontinued troglitazone (Rezulin) <sup>2</sup> therapy due to jaundice or hepatic disease. Monitor baseline ALT when initiating therapy, then periodically as clinically indicated. May cause anovulatory premenopausal women to resume ovulation. In-vitro studies do not suggest any clinically relevant effect on the metabolism of oral contraceptives (OC). However, because of past experience with another thiazolidinedione, <sup>2</sup> caution should be exercised with patients receiving pioglitazone or rosiglitazone and an OC. Thiazolidinediones may increase HDL and LDL levels. The long-term effects are not known.
	rosiglitazone 2, 4, 8 mg	Avandia	4-8	
	rosiglitazone/metformin 1/500 mg, 2/500 mg, 4/500 mg	Avandamet	4/1000-8/2000	
	pioglitazone 15, 30, 45 mg	Actos	15-45	

<sup>1</sup> Sulfonylureas act by stimulating endogenous insulin production by the pancreas. Proper selection, dosages, and patient education are important to avoid hypoglycemic episodes. The most common side effects, aside from hypoglycemia, are GI disturbances, which tend to be dose related and disappear when dosage is decreased. Sulfonylureas have been associated with rare occurrences of cholestatic jaundice and hepatitis; if either condition occurs, the sulfonylurea should be discontinued. All sulfonylureas are contraindicated in DKA.

<sup>2</sup> Troglitazone (Rezulin), was removed from the market in March 2000 by the FDA after being linked to liver failure, liver transplants, and deaths.

# INSULIN

INSULIN TYPE	ONSET	PEAK	DURATION	COMMENTS
<b>Very Short Acting</b> Insulin lispro Humalog (Lilly)	0-15 minutes	30-90 minutes	2-4 hrs	Insulins lispro, aspart, and glulisine are very short acting products. Both lispro and aspart are available mixed with protamine as fixed-ratio combinations, which provide the benefit of rapid and intermediate action.
	10-20 minutes	60-180 minutes	3-5 hours	
Insulin aspart NovoLog (NovoNordisk)	10-20 minutes	60-120 minutes	3-4 hours	Humalog mix 75/25 is a mixture of 75% insulin lispro protamine suspension and 25% insulin lispro. NovoLog 70/30 is a mixture of 70% insulin aspart protamine and 30% insulin aspart.
<b>Short Acting</b> Regular insulin	30 minutes-1 hr	2-4 hrs	4-8 hrs	NPH and regular insulins are also available as fixed-ratio combinations of 50/50 and 70/30.
<b>Intermediate Acting</b> NPH Insulin Lente Insulin	2-4 hrs	4-10 hrs	10-16 hrs	NPH and regular insulins are also available as fixed-ratio combinations of 50/50 and 70/30.
<b>Long Acting</b> Insulin glargine Lantus (Aventis)	4-6 hrs	No pronounced peak	18-24 hrs	Insulin glargine (Lantus) is indicated for once daily subcutaneous administration at a consistent time in patients who require basal (long-acting) insulin for the control of hyperglycemia. Insulin glargine (Lantus) must NOT be diluted or mixed with any other insulin or solution, and is not intended for intravenous administration.
Ultralente	4-6 hrs	8-20 hrs	24-28 hrs	

The onset, peak, and duration of any insulin preparation may vary depending on injection site, exercise, depth of injection, and other variables.

Reduced hyperglycemia and an improvement in glucose toxicity will occur in type 2 diabetes, given sufficient doses of insulin. Individuals with moderately severe type 2 disease, defined as a fasting plasma glucose 140-200 mg/dl, will often show sufficient response to a single or twice-daily dose of insulin.

One study has suggested that bedtime administration is most effective when using intermediate-acting insulin. Another study suggested that 9:00 p.m. is a reasonable time for the single daily insulin dose when used in combination with sulfonylureas. The former study reported improved glycemic control, and the latter study reported less weight gain with the bedtime or evening insulin doses when compared to morning insulin doses.

Individuals with severe type 2 diabetes, defined as a fasting plasma glucose > 200 mg/dl, or those who have proved not responsive to the above-mentioned regimens, may require frequent insulin dosing. This usually requires the addition of short-acting insulin before meals.

The total daily insulin doses for type 2 diabetes may range from 0.4-1.2 U/kg/day. Please be aware that in insulin-resistant patients, doses of > 1.5 U/kg/day may be required.

Total daily dosage for people with type 1 diabetes may range from 0.3-0.5 U/kg/day.

The degree of glucose lowering is dose-related. Studies have demonstrated a lowering of fasting glucose of up to 190 mg/dl from baseline in patients with type 2 diabetes treated with insulin.

Source: White, Jr., JR. *The pharmacological reduction of blood glucose in patients with type 2 diabetes mellitus. Clinical Diabetes. Vol. 16 No. 2, 1998.*

## OTHER MEDICATIONS

CLASS	GENERIC NAME STRENGTH	TRADE NAME	DOSAGE/ROUTE (total daily)
Incretin mimetic	Exenatide injection 5, 10 mcg	Byetta	5 mcg-10 mcg SC bid within 60 minutes before the morning and evening meals
<p><b>COMMENTS:</b>  <b>Byetta is an adjunct therapy for type 2 patients who although taking metformin, a sulfonylurea, or a combination of both, have not achieved adequate glycemic control. Initiate Byetta therapy at 5 mcg within 60 minutes before the morning and evening meals.</b> The dose may be increased to 10 mcg bid after 1 month of therapy.</p> <p>Incretin mimetics stimulate insulin production in response to elevated blood sugar levels, inhibit post-meal glucagon release, and slow nutrient absorption. When Byetta is added to metformin therapy, the current dose of metformin can be continued. When Byetta is added to sulfonylurea therapy, a reduction in the dose of sulfonylurea may be considered to reduce the risk of hypoglycemia.</p> <p><b>PRECAUTIONS:</b>                      Byetta is not a substitute for insulin in insulin-requiring patients. Byetta should not be used in patients with type 1 diabetes or for the treatment of diabetic ketoacidosis. The concurrent use of Byetta with insulin, thiazolidinediones, D-phenylalanine derivatives, meglitinides, or alpha-glucosidase inhibitors has not been studied. Byetta is not recommended for use in patients with end-stage renal disease or severe renal impairment or in patients with severe gastrointestinal disease. Byetta slows gastric emptying and may reduce the absorption of orally administered drugs. Drugs requiring food at the time of administration should be taken with a meal or snack when Byetta is not administered. Medications dependent on threshold concentrations for efficacy, such as contraceptives and antibiotics, should be taken at least 1 hour before Byetta injection.</p> <p><b>SIDE EFFECTS:</b>                      Observe for hypoglycemia if prescribed with a sulfonylurea. Other adverse events associated with Byetta (vs. placebo) include nausea (44% vs. 18%), vomiting (13% vs. 4%) and diarrhea (13% vs. 6%).</p>			

## COMPARISON OF ORAL ANTI-DIABETIC AGENTS

	<b>Biguanides</b>	<b>Sulfonylureas</b>	<b>Meglitinides</b>	<b>Thiazolidinediones</b>	<b>α-Glucosidase Inhibitors</b>
Change in A1C (%)	1.5-2.0	2.0-2.5	0.7-1.0	0.5-2.0	0.5-0.8
Onset of action	Slow dose titration	Fast	Fast	Slow mode of action	Slow dose titration
Lipid effect	Favorable	Neutral	Neutral	Favorable	
Hyperinsulinemia	Decrease ↓↓	Increase ↑↑↑	Increase ↑↑	Decrease ↓↓↓	Neutral
Cardiovascular	Improved (UKPDS)	Uncertain	Unknown	Improved (small studies)	Improved (STOP-NIDDM)
Weight gain	No	Yes	Yes	Yes	No
Hypoglycemia	No	Yes	Yes (uncommon)	No	No
Long term safety	Yes	Yes	No	No	No
Requires monitoring	Renal function	Hypoglycemia	Hypoglycemia	ALT at baseline, then periodically as indicated	Liver function with high doses
Use in organ failure					
Renal	Contraindicated	Caution	Yes	Yes	Yes
Hepatic	Contraindicated	Caution	Yes	Contraindicated	Relative contraindication
Heart	Contraindicated	Caution	Caution	Contraindicated	Yes
Common side effects	Abdominal pain, diarrhea, flatulence	Hypoglycemia	Hypoglycemia	Weight gain, fluid retention, heart failure	Abdominal pain, diarrhea, flatulence
Serious side effects	Lactic acidosis	Hypoglycemia	Hypoglycemia	Hepatotoxicity	None
Preservation of β cell function	Possible	No	Possible	Possible	Neutral

## Summary of Lipid Lowering Therapy

Patients with diabetes have one of the highest risks of CVD and are likely to benefit the most from early intervention with cardioprotective drugs. Lipid abnormalities are known to be more prevalent in patients with type 2 diabetes, contributing to higher rates of CVD. Attention to reducing modifiable cardiac risk factors as well as lowering LDL cholesterol, raising HDL cholesterol, and lowering triglycerides has been shown to reduce macrovascular disease and mortality, particularly for those who have had prior cardiovascular events. Aggressive treatment of diabetic dyslipidemia will reduce the risk of coronary heart disease (CHD) in people with diabetes.

Recent studies of prevention of cardiovascular events with lipid-lowering therapy include the PROVE-IT trial (Pravastatin or Atorvastatin Evaluation and Infection Thrombolysis in Myocardial Infarction), the CARDS study (Collaborative AtoRvastatin Diabetes Study), and the Heart Protection Study. The PROVE-IT trial was conducted in over 4000 patients and showed the benefit of intensive lipid lowering compared to standard therapy in reducing the incidence of death or major cardiovascular events in patients having recently had an acute coronary syndrome. The CARDS study looked at primary prevention of cardiovascular disease (CVD) in 2,838 patients with type 2 diabetes having at least one other CVD risk factor. A total risk reduction of 37% was observed in the incidence of major cardiovascular events. The Heart Protection Study, which assessed the effects of a substantial LDL cholesterol reduction in 5,963 individuals with diabetes, concluded that statin treatment is beneficial for people with diabetes whether or not they have evident cardiovascular disease.

## Screening Recommendations

- Annual testing for lipid disorders. More often if necessary to reach goal levels.
- Test every two years for those with low risk profiles (LDL<100 mg/dl, HDL>50 mg/dl, and triglycerides <150 mg/dl).

## Lifestyle Modifications

Specific lifestyle changes aimed at lowering lipid profiles are recommended for all patients with diabetes. Lifestyle intervention should include medical nutrition therapy (MNT), increased physical activity, smoking cessation, and weight loss if indicated. Nutrition therapy should be tailored to the individual patient and focus on the reduction of saturated fat, cholesterol, and transunsaturated fat intake.

## Treatment Recommendations and Goals

### Pharmacological Therapy

The first priority of pharmacological therapy is to lower LDL cholesterol to a target goal of <100 mg/dl or to achieve a reduction in LDL of 30–40%. For LDL lowering, statins are the drugs of choice. Other drugs that lower LDL include nicotinic acid, ezetimibe, bile acid sequestrants, and fenofibrate.

Drug	Dose (mg)**	LDL % Reduction*
Atorvastatin	10	39
Lovastatin	40	31
Pravastatin	40	34
Simvastatin	20-40	35-41
Fluvastatin	40-60	25-35
Rosuvastatin ***	5-10	39-45

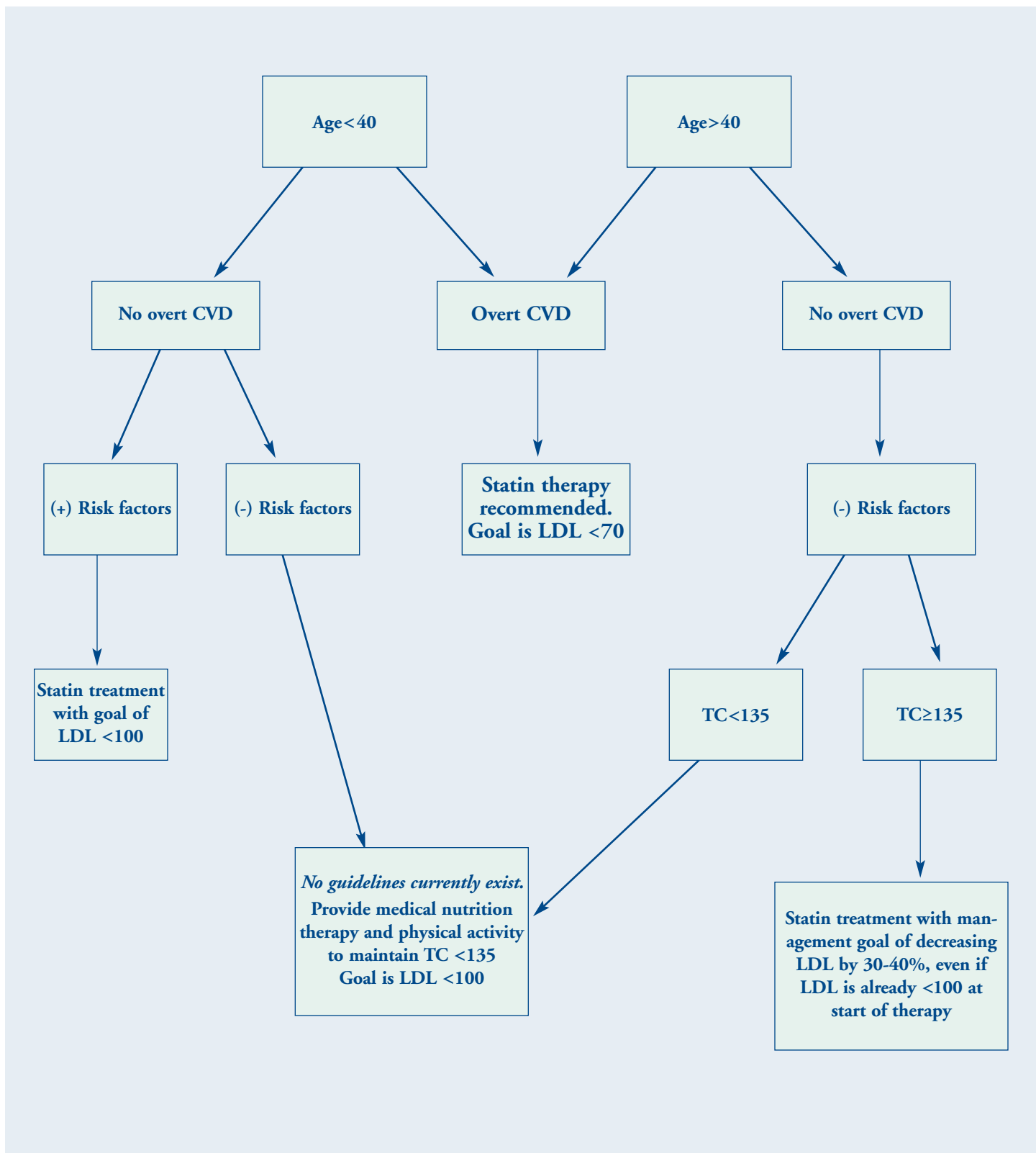
\*Estimated LDL reductions were obtained from U.S. Food and Drug Administration package inserts for each drug.

\*\*All of these are available at doses up to 80 mg. For every doubling of the dose above standard dose, an approximate 6% decrease in LDL-C level can be obtained.

\*\*\*For rosuvastatin, doses available up to 40 mg; the efficacy for 5 mg is estimated by subtracting 6% from the Food and Drug Administration-reported efficacy at 10 mg.

Source: Grundy SM, Cleeman JJ, Merz CN, Brewer HB Jr, Clark LT, Hunninghake DB, Pasternak RC, Smith SC Jr, Stone NJ. Implications of recent clinical trials for the National Cholesterol Education Program Adult Treatment Panel III guidelines. *Circulation* 110:233, 2004.

## LIPID LOWERING DECISION TREE IN TYPE 2 DIABETES



Developed by Stuart Chipkin, MD

## Coronary Heart Disease

Cardiovascular risk factors should be assessed at least annually. For patients without clear or suggestive symptoms of coronary artery disease, a risk factor-based approach is recommended, evaluating for dyslipidemia, hypertension, smoking, a positive family history of premature coronary disease, or the presence of micro- or macroalbuminuria. A recent study, however, concluded that the presence of traditional and emerging cardiac risk factors failed to identify a significant percentage of patients with silent ischemia<sup>1</sup>.

### Recommendations

- An ACE inhibitor, unless contraindicated, is recommended for patients >55 years of age with one cardiovascular risk factor (independent of hypertensive status).
- A beta-blocker should be considered for patients with a prior myocardial infarction or for those undergoing major surgery.
- Screening tests such as a stress ECG and/or stress echocardiography, and/or perfusion imaging may be beneficial for asymptomatic patients.
- A risk factor evaluation aimed at stratifying patients by 10 year risk should be considered.
- Metformin is contraindicated in patients with treated heart failure.
- Use caution in prescribing thiazolidinediones for patients with preexisting edema, concurrent insulin therapy, heart failure, or other heart diseases.

## Aspirin Therapy in Diabetes

Both men and women with diabetes have a two- to four-fold increased risk of dying from the complications of cardiovascular disease. Evidence suggests that aspirin therapy should be prescribed as a secondary prevention strategy and, if no contraindications exist, should also be used as a primary prevention strategy in men and women with diabetes who are at high risk (over 40 or with other CVD risk factors). Use of aspirin has not been studied in individuals under the age of 30.

### Recommendations

- Use aspirin therapy (75-162 mg/day) as a secondary prevention strategy in diabetic men and women with a history of myocardial infarction, vascular bypass procedure, stroke or transient ischemic attack, peripheral vascular disease, claudication, and/or angina.
- Use aspirin therapy (75-162 mg/day) as a primary prevention strategy in men and women with type 2 diabetes at increased cardiovascular risk, including those over 40 years of age or who have additional risk factors (family history of CVD, hypertension, smoking, dyslipidemia, albuminuria).
- Use aspirin therapy as a primary prevention strategy in men and women with type 1 diabetes at increased cardiovascular risk, including those over 40 years of age or who have additional risk factors (family history of CVD, hypertension, smoking, dyslipidemia, albuminuria).
- People with aspirin allergy, bleeding tendency, anticoagulant therapy, recent gastrointestinal bleeding, and clinically active hepatic disease are not candidates for aspirin therapy. Other antiplatelet agents may be a reasonable alternative for high-risk patients with contraindications to aspirin therapy.
- Aspirin therapy should not be recommended for patients under the age of 21 years because of the increased risk of Reye's syndrome associated with aspirin use in this population.

Source: American Diabetes Association (Position Statement). Aspirin therapy in diabetes. *Diabetes Care* 27 (Supplement. 1): S72-S73, 2004.

<sup>1</sup>Wackers FJ, et al. Detection of ischemia in asymptomatic diabetic subjects. *Diabetes Care* 27:1954-1961, 2004.

## Summary

Hypertension contributes to the development and progression of chronic complications of diabetes. The primary goal of therapy for adults should be to decrease blood pressure to <130/80 mmHg. Epidemiological analysis of the United Kingdom Prospective Diabetes Study (UKPDS) showed a continuous relationship between the level of systolic blood pressure and the risk of stroke, diabetes-related deaths, heart failure, microvascular complications, and visual loss.

## Screening Recommendations

- Measure blood pressure at every routine visit. Patients with systolic blood pressure (SBP)  $\geq 130$  mmHg or diastolic blood pressure (DBP)  $\geq 80$  mmHg require confirmation on a separate day.
- Orthostatic readings should be performed when clinically indicated.<sup>1</sup>

Cardiovascular autonomic neuropathy is common in patients with diabetes and can cause falsely low or high readings depending on the position of the patient when the blood pressure is taken<sup>2</sup>. Blood pressure and pulse should ideally be measured both in the supine and standing position leaving two minutes in between readings. Two or more determinations in each position should be obtained using an appropriately sized cuff. If the first two readings differ by more than 5mmHg, additional readings should be obtained and averaged.

## Lifestyle Modifications

Changes such as weight loss, exercise, smoking cessation, and prudent reduction of salt and alcohol should be a major aspect of treatment of hypertension. A maximum three-month trial of lifestyle/behavioral modification is recommended for those with a SBP 130-139 mmHg or a DBP of 80-89 mmHg.

## Treatment

If target levels are not reached by the end of three months, pharmacological therapy should be instituted. Patients with SBPs of  $\geq 140$  mmHg or DBPs  $\geq 90$ mmHg should receive prescriptions for both antihypertensive medication as well as lifestyle changes.

### Treatment Categories

Systolic	Diastolic	Comment
<130	<80	Target blood pressure
130-139	80-89	Lifestyle changes alone (maximum 3 months), then add drug therapy
$\geq 140$	$\geq 90$	Lifestyle changes plus drug therapy

<sup>1</sup> Orthostatic measurement is recommended to rule out autonomic neuropathy. Orthostatic hypotension is defined as a fall in the systolic blood pressure of 20-30 mmHg or diastolic blood pressure of 10-15 mmHg after two to three minutes of standing.

Arauz-Pacheco C, Parrott M A, Raskin P. The treatment of hypertension in adult patients with diabetes. *Diabetes Care* 25: 134-147, 2002.

<sup>2</sup> Maser RE, Pfeifer MA, Dorman JS, Kuller LH, Becker DJ, Orchard TJ. Diabetic autonomic neuropathy and cardiovascular risk: The Pittsburgh Epidemiology of Diabetes Complications Study III. *Arch Intern Med* 150:1218-1222, 1990.

(continued on reverse)

### Benefit of Aggressive Treatment

Aggressive treatment of even mild-to-moderate hypertension is beneficial.<sup>1</sup> Continued reduction of blood pressure into the normal range reduces strokes, diabetes-related deaths, heart failure, and microvascular complications, including retinopathy, nephropathy, and possibly neuropathy. Both systolic and diastolic hypertension markedly accelerates the progression of diabetic nephropathy. Control of hypertension has been demonstrated conclusively to reduce the rate and progression of nephropathy and to reduce the complications of cerebrovascular disease and cardiovascular disease (CVD).

### Pharmacological Therapy

Initial drug therapy should begin with any currently recommended antihypertensive medication known to reduce CVD events in patients with diabetes (ACE inhibitors, angiotensin II receptor blockers (ARBs), beta-blockers, diuretics, and calcium channel blockers). Patients with SBPs of  $\geq 140$  mmHg or DBPs  $\geq 90$  mmHg should receive prescriptions for both antihypertensive medication as well as lifestyle and behavioral changes.

- All patients with diabetes and hypertension should be treated with ACE inhibitors, or ARBs if ACE inhibitors are not tolerated. Add a thiazide diuretic if needed to reach target blood pressure.
- Monitor renal function and serum potassium levels when using ACE inhibitors, ARBs, or diuretics.
- Multiple drug therapy utilizing two or more agents at proper doses is often necessary to reach target levels.
- Clinical trials provide evidence that ACE inhibitors and ARBs have an additional impact on nephropathy. **Refer to the section on Nephropathy.**
- The addition of a beta-blocker should be considered for those who have had a recent MI.
- In pregnant patients with diabetes and chronic hypertension, target goals of 110-129/65-79 mmHg are suggested. ARBs and ACE inhibitors are contraindicated during pregnancy and should be discontinued in women planning pregnancy due to their teratogenic effect.
- In elderly patients blood pressure should be lowered gradually.

<sup>1</sup> Adler A, Stratton I, Neil H, Yudkin J, Matthews D, Cull C, Wright A, Turner R, Holman R. Association of systolic blood pressure with macrovascular and microvascular complications of type 2 diabetes (UKPDS 36): Prospective observational study. *BMJ* 321: 412-419, 2000.

## Summary

The earliest clinical evidence of nephropathy is the appearance of low but abnormal levels (30-300 mg/day or 20-200 µg/min) of albumin in the urine, referred to as microalbuminuria. Microalbuminuria, a harbinger of renal failure (types 1 and 2) and cardiovascular complications (type 1) in diabetes, is an albumin concentration in the urine that is greater than normal (but is not detectable with common urine dipstick assays for protein).

## Screening

### When to Screen

- Type 2 diabetes: at diagnosis and yearly thereafter.
- Type 1 diabetes: after five years of disease duration and yearly thereafter.
- Yearly testing is recommended even if the patient has previously screened positive for microalbuminuria and/or is currently taking ACE inhibitors or angiotensin II receptor blockers (ARBs) in order to provide monitoring and to ensure adequate control of microalbuminuria.

### Screening Tests

Most authorities recommend the analysis of a spot sample for the albumin-to-creatinine ratio. Additional options, including a 24 hour urine collection or a timed collection, are rarely necessary for screening, but do provide a more complete evaluation. Due to the variability in albumin excretion, 2 of 3 samples done in a 3- to 6-month period should show elevated levels before diagnosing microalbuminuria. If normal, repeat yearly. Random spot collection (preferred):

- Normal <30 µg/mg creatinine
- Microalbuminuria 30 -299 µg/mg creatinine
- Clinical albuminuria ≥300 µg/mg creatinine

Several factors may elevate the albumin excretion rate. Screening should be postponed in the following situations: exercise within 24 hours, marked hypertension or hyperglycemia, infection, hematuria, fever, or heart failure.

## Hypertension and Nephropathy

To reduce the risk or slow the progression of nephropathy, optimal glucose and blood pressure control are recommended. Both systolic and diastolic hypertension markedly accelerate the progression of diabetic nephropathy. Control of hypertension—regardless of agent used—has been demonstrated conclusively to reduce the rate and progression of nephropathy and to reduce the complications of cerebrovascular disease and cardiovascular disease. **Refer also to the Cardiovascular and Hypertension sections.**

## Pharmacological Therapy

For patients with both micro- and macroalbuminuria, either ACE inhibitors or angiotensin II receptor blockers (ARBs) should be used except during pregnancy. To assess hyperkalemia, serum potassium levels should be monitored in patients treated with either class of medication. Clinical trials reveal the following observations:

- In patients with type 1 diabetes and microalbuminuria and hypertension, ACE inhibitors delay the progression of nephropathy.
- For type 2 patients with both hypertension and microalbuminuria, both ACE inhibitors and ARBs delay the progression to macroalbuminuria.
- In type 2 patients who have hypertension, macroalbuminuria, and renal insufficiency, ARBs delay the progression of nephropathy.
- Dihydropyridine calcium channel blockers (DCCBs) are less likely to slow the progression of nephropathy compared with ACE inhibitors or ARBs. DCCBs should be used only as an additional therapy in patients already treated with ACE inhibitors or ARBs.
- The UKPDS demonstrated beta-blockers to be as effective as ACE inhibitors in reducing negative outcomes.
- For patients with albuminuria or nephropathy who cannot tolerate ACE inhibitors and/or ARBs, consider using beta-blockers, diuretics or non-DCCBs. Non-DCCBs may reduce albuminuria in diabetic patients including during pregnancy.
- Due to their teratogenic potential, caution is advised when using either ACE inhibitors or ARBs in women of childbearing age.

*Modified from: American Diabetes Association (Position Statement). Standards of medical care for patients with diabetes mellitus. Diabetes Care 28 (Supplement 1): S18-S19, 2005.*

*Source: American Diabetes Association (Position Statement). Treatment of hypertension in diabetes. Diabetes Care 27 (Supplement 1): S65-S67, 2004.*

## Summary

Foot ulcers and amputations resulting from neuropathy and/or peripheral vascular disease are major causes of disability and morbidity among people with diabetes. The risk of ulcers or amputations is increased in people who have had diabetes  $\geq 10$  years, are male, have poor glucose control, smoke, or have cardiovascular, retinal, or renal complications. Early recognition of problems and risk factor management can delay or prevent unfavorable outcomes.

## Screening

### Risk Identification

The following conditions are associated with an increased risk for amputation:

- Peripheral neuropathy with loss of protective sensation
- Altered biomechanics
- Evidence of increased pressure (hemorrhage under a callus, erythema)
- Bony deformity
- Peripheral vascular disease (PVD)
- History of ulcers or amputation in the other limb
- Severe nail pathology

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## Risk Category

### Low Risk

#### All of the following:

- Intact protective sensation
- Pedal pulses present
- No severe deformity
- No prior foot ulcer
- No amputation

### High Risk

#### One or more of the following:

- Loss of protective sensation
- Absent pedal pulses
- Severe foot deformity
- History of foot ulcer
- Prior amputation

## Recommendations

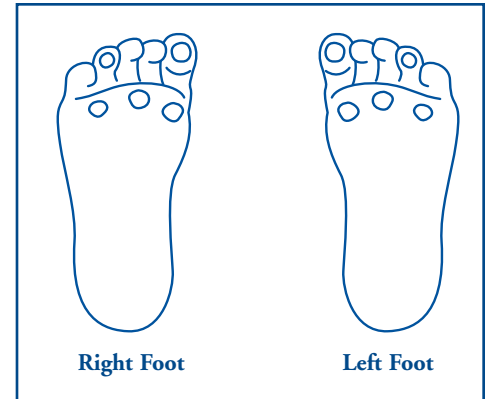
- Perform a visual foot inspection at each primary care visit.
- Conduct an annual comprehensive foot exam. The exam may take place in the primary care setting and should include a visual inspection and palpation for pulses as well as a sensory evaluation using a tuning fork or a Semmes-Weinstein monofilament (see reverse for monofilament and tuning fork instructions).
- Provide self-care education to all patients especially those with risk factors such as smoking or prior lower extremity complications.
- Refer high risk patients to a foot care specialist for ongoing preventive care.
- Screen for peripheral artery disease (PAD) by assessing the pedal pulses and evaluating for a history of claudication. Consider obtaining an ankle-brachial index (ABI) as many patients with PAD are asymptomatic.
- Refer patients with significant claudication or a positive ABI for further vascular assessment.
- Offer a multidisciplinary approach for patients with foot ulcers and high risk feet.

(continued on reverse)

## Assessing Protective Sensation

### Use of the Semmes-Weinstein monofilament

- Have the patient look away or close his or her eyes.
- Hold the filament perpendicular to the skin.
- Avoiding any ulcers, calluses, or sores, touch the monofilament to the skin until it bends. Hold in place for approximately 1.5 seconds, then gently remove it.
- Randomly test the sites shown on the diagram to the right.
- Elicit a response from the patient at each site. Lack of sensation at any site may indicate diabetic neuropathy.
- The monofilament may be cleaned with 1:10 sodium hypochlorite solution if contaminated with blood or body fluids.



### Tuning fork instructions

- Strike a 128 Hz tuning fork (hard enough to make a noise).
- Place the vibrating tuning fork on the dorsum of the great toe, just proximal to the nail bed.
- With the hand that is not holding the tuning fork, place a finger on the plantar surface of the same toe.
- Have the patient close his or her eyes and inform you when vibration is no longer perceived.
- Gauge the difference between when the patient stops feeling the vibrating tuning fork and when you stop sensing vibration.
- If the patient stops feeling the vibration almost immediately, a severe loss is present.
- If the patient and examiner stop feeling the vibration at nearly the same moment, vibratory perception is considered normal.
- Intermediate losses can be judged as mild or moderate loss of perception.
- Some clinicians recommend counting how long the patient perceives the vibration and use 10 seconds as a cut-off for normal perception.

## Monofilament Resources

**All monofilaments are 5.07 (10 gm.)**

### Lower Extremity Amputation (LEAP) Program

Bureau of Primary Health Care (BPHC)  
 1-888-ASK-HRSA  
[www.bphc.hrsa.gov/leap](http://www.bphc.hrsa.gov/leap)  
 Disposable

### Medical Monofilament Manufacturing, LLC

1-508-746-7877  
[www.medicalmonofilament.com](http://www.medicalmonofilament.com)  
 Disposable  
 \$0.19-\$0.23

### Center for Specialized Diabetes Foot Care

1-800-543-9055 ext. 127  
[www.middelta.com](http://www.middelta.com)  
 Durable  
 \$10.00 each

### Connecticut Bio Instruments

1-203-744-7488  
[www.cbi-pace.com](http://www.cbi-pace.com)  
 Durable  
 \$15.00 each

### North Coast Medical, Inc

1-800-821-9319  
[www.ncmedical.com](http://www.ncmedical.com)  
 Durable  
 \$ 25.95 each  
 Set of six, assorted sizes: \$124.95

### Sensory Testing Systems

1-888-289-9293  
[www.sensorytestingsystems.com](http://www.sensorytestingsystems.com)  
 Durable  
 \$10.00 each

### Sammons, Pruss, Rolyan

Durable  
 1-800-558-8633  
 \$19.99 each  
 Set of five, assorted sizes: \$99.99

### Purpose

Medical Nutrition Therapy (MNT) is an integral component in assisting patients in acquiring and maintaining the knowledge, skills, and behaviors to successfully meet the challenges of daily diabetes self-management. Adequate nutrition advice or an individualized meal plan will assist patients in achieving optimal blood glucose control. Achieving nutrition-related goals requires a coordinated team effort that includes the person with diabetes. A referral to a registered dietitian skilled in the complexities of diabetes management is strongly recommended.

### Goals

- Achieve and maintain near normal blood glucose levels as well as optimal lipid levels, blood pressure, and recommended body weight.
- Prevent and treat the acute and long-term complications of diabetes.
- Improve overall health through optimum nutrition and physical activity.
- Address individual needs, considering cultural preferences, lifestyle, and ability to change.
- Provide for the needs of special populations:
  - Youth with type 1 or type 2 diabetes
  - Pregnant and lactating women
  - Older adults
  - Individuals treated with insulin and insulin secretagogues
  - Individuals at risk for developing diabetes
  - Individuals with deteriorating renal function

### Basic Education

For newly diagnosed patients or patients not recently educated about their diabetes. Basic survival skills should include:

- Relationship of food and meals to blood glucose levels, medication, and activity.
- Monitoring of total grams of carbohydrate intake.
- Basic food/meal plan guidelines.
- Consistent times each day for meals and snacks.
- Recognition, prevention, and treatment of hypoglycemia.
- Sick day management.
- Self-monitoring of blood glucose.

Sources:

*Modified from the American Diabetes Association (Position Statement). Evidence-based nutrition principles and recommendations for the treatment and prevention of diabetes and related complications, Diabetes Care 26 (Supplement 1): S51-S61, 2003.*

*American Diabetes Association (Position Statement). Standards of medical care in diabetes, Diabetes Care 28 (Supplement 1): S4-S36, 2005.*

### Essential Education for Ongoing Nutrition Self-Management

Ongoing education is recommended for patients recently diagnosed with diabetes who have been taught basic survival skills or those who have not received current nutrition education. Others who may benefit from nutrition self-management education include patients having difficulties with diabetes management or those experiencing changes in lifestyle, medication, weight, or childbearing status. Follow-up sessions should focus on increasing the patient's knowledge, skills, and flexibility as he or she gains experience living with diabetes.

#### Topics include:

- Weight loss strategies, including reduction in energy intake and/or increase in physical activity, if indicated.
- Amount (grams) and type of carbohydrate in food and influence on blood glucose levels.
- Sources of nutrients and their effect on blood glucose and lipid levels.
- Carbohydrate counting.
- Label reading and grocery shopping guidelines.
- Dining out.
- Modifying fat intake.
- Use of sugar-containing foods, dietetic foods, and sweeteners.
- Alcohol guidelines.
- Using blood glucose self-monitoring for glucose pattern control.
- Adjusting meal times.
- Adjusting food for exercise.
- Special occasions, holidays.
- Travel, schedule changes.
- Vitamin and mineral supplementation.

Low carbohydrate diets (restricting total CHO to <130 g/day) are not recommended in the management of diabetes.

## Purpose

The main aims of diabetes education are to provide patients with the management skills necessary to achieve optimal control of their diabetes, and to assist them in becoming effective self-directed decision makers for their own diabetes care, health, and well being. Without comprehension of the relationship between home blood glucose readings, meal planning, and physical activity, patients with diabetes will be hindered in their ability to achieve optimal blood glucose control, and are at higher risk for long term complications. A referral to a nurse or other clinician who has expertise in culturally competent diabetes self-management education is strongly recommended.

## Goals

- Prevent the acute complications of diabetes, hyperglycemia, and hypoglycemia
- Prevent or delay the chronic complications of diabetes
- Promote healthy birth outcomes through preconception counseling, monitoring, and support during and following pregnancy
- Enhance patient participation in the clinician's diabetes treatment plan and improve patient confidence in self-management skills
- Enhance psychosocial adjustment to living with a chronic disease
- Decrease health care costs by reducing the need for expensive hospital stays and the treatment of complications

## Basic Education (Survival Skills)

### Overview

- Nature of diabetes in terms of chronicity and metabolism
- Differences between type 1 and type 2 diabetes
- Balance of meals, physical activity, and medication, if prescribed

### Exercise

- Impact of exercise on blood glucose, lipid levels, hypertension, weight, and stress reduction

### Acute Complications

- Hypoglycemia recognition, causes, treatment, and prevention
- Hyperglycemia recognition, causes, treatment, and prevention
- Sick day management

### Oral Medication Management

- Action, side effects, timing of dose(s), interactions

### Insulin Management

- Action, dosage, onset/peak/duration, pre-loading, mixing, injecting, site selection, storage, syringe disposal
- Use of Glucagon, if appropriate

### Psychosocial

- Assess adjustment to lifestyle change, screen for depression, refer to counseling as needed

## Self-Monitoring

- Blood glucose meter selection and orientation
- Time(s) to check blood sugar/rationale
- Recording and interpretation of results, encouraging dialogue with clinician
- Disposal of lancets and contaminated materials
- Performance of urinary ketone testing, if appropriate

## Continuing Education

### Overview

- Benefits of optimal diabetes control and factors that influence it
- Effects of insulin resistance, deficiency, and excess
- Treatment of insulin resistance through weight loss, activity, and medication

### Exercise

- Exercise planning appropriate to age, ability, interest, and willingness
- Complication avoidance during exercise

### Oral Medication Management

- Action times and maximum dose
- Influences of other medications on blood glucose and possible interactions with oral diabetes medications

### Insulin Management

- Methods of storing and adjusting insulin during travel
- Syringe reuse: techniques, benefits, and risks
- Traveling with diabetes, transporting supplies, and medication adjustment

### Self-Monitoring

- Use of self-monitoring of blood glucose to adjust the treatment plan based on approved guidelines
- Establish glycated hemoglobin targets

### Complication Prevention and Recognition

- Self foot care, early detection of problems, and importance of timely access to care
- Early recognition of eye disease and need for complete eye exam annually
- Impact of lipids, importance of monitoring annually or every two years if values fall within accepted risk levels
- Importance of blood pressure control, need for regular monitoring
- Identification of the symptoms, treatment, and major factors of preventing kidney disease, peripheral vascular disease, cardiovascular disease, periodontal disease, and neuropathy
- Importance of pneumonia vaccine and yearly flu vaccine
- Smoking cessation

### Summary

Patients with diabetes who smoke have a heightened risk of morbidity and premature death due to macrovascular complications. Smoking is also related to the premature development of microvascular disease and may have a role in the development of type 2 diabetes. The cardiovascular burden of diabetes in combination with smoking is not being consistently presented to people with diabetes. Only about half of the smokers with diabetes have been advised to quit smoking by their health care providers.

### Screening recommendations

- Ask about smoking at every visit.
- For adults who have never smoked, flag the record to avoid repeat questions.
- For adults who have previously smoked, check for relapse.
- For children and adolescents who do not smoke, continue to ask at every visit.

### Treatment Recommendations

Include smoking cessation counseling and other forms of treatment as a part of routine diabetes care. Remember the “5 A’s”:

- **A**sk about smoking at every visit.
- **A**ssess readiness to quit among current tobacco users.
- Assess current level of nicotine dependence.
- **A**dvice all smokers of the importance of quitting, describing the added risks of smoking and diabetes.
- **A**ssist those ready to quit:
  - Establish a quit date.
  - Provide a referral to a smoking cessation program such as QuitWorks.\*
  - Provide a referral to behavioral counseling if needed.
  - Offer pharmacological supplements if appropriate.
- **A**rrange a follow-up phone call soon after the quit date.

### For those who have quit:

- Encourage maintenance.
- Review benefits of cessation.
- Anticipate threats to maintenance, such as weight gain, depression, prolonged withdrawal.

### Pharmacological Therapy

- As with the general population, pharmacological agents increase smoking cessation rates when used in conjunction with behavioral interventions.
- Nicotine replacement therapy for 4 to 6 weeks is helpful for those with a moderate to severe nicotine dependence.
- Bupropion or nortriptyline is useful in decreasing the desire to smoke and allaying depression as well.

Sources:

American Diabetes Association (Position Statement). *Smoking and diabetes. Diabetes Care. 27: S74-S75 (Supplement 1), 2004.*

Fiore MC, Bailey WC, Cohen SJ, et. al. *Treating tobacco use and dependence. Quick Reference Guide for Clinicians. Rockville, MD: U.S. Department of Health and Human Services. Public Health Service. October 2000.*

\*QuitWorks is the stop-smoking service for Massachusetts residents created by the Massachusetts Department of Public Health and all the major health plans across the state. QuitWorks provides free, confidential information and tobacco treatment counseling by telephone for any Massachusetts resident, regardless of health insurance coverage.

(continued on reverse)

## Smoking Intervention Model

### ASK About Smoking At Every Visit

Document in chart

### ADVISE All Smokers to Quit

Advice should be clear, strong, and personalized

### ASSIST Smokers in Quitting

- ✓ ASSESS motivation to make a quit attempt

#### *Ready to Quit Now*

- ✓ Identify reasons for wanting to quit
- ✓ Develop a quit plan
  - Set quit date within 2 weeks
  - Review previous quit attempts
  - Identify smoking triggers and challenges
  - Brainstorm strategies
  - Inform family, friends, and co-workers
- ✓ Provide self-help materials and referrals
- ✓ Encourage nicotine replacement therapy: patch, gum, nasal spray, inhaler or Non-NRT (bupropion-SR), unless contraindicated
- ✓ Give advice on successful quitting
  - Total abstinence
  - Avoid alcohol
  - Plan for dealing with smokers in the house

#### *Not Ready to Quit Now*

- ✓ Use the 4Rs to enhance motivation
  - **R**elevance: Provide patient-specific information
  - **R**isks: Ask patient to identify negative consequences
  - **R**ewards: Ask patient to identify benefits
  - **R**epetition: Repeat every visit

### ARRANGE Follow-up

#### *If Quit (Relapse Prevention)*

- ✓ Congratulate, encourage maintenance
- ✓ Review benefits of cessation
- ✓ Review successes during quit period
- ✓ Review problems encountered, offer possible solutions
- ✓ Anticipate problems or threats to maintenance such as weight gain, depression, or prolonged withdrawal

#### *Timing*

Contact soon after the quit date, preferably within the first week; further follow-up as needed

#### *If Quit Attempt Unsuccessful*

- ✓ Ask for recommitment to total abstinence
- ✓ Remind patient to use lapse as a learning experience
- ✓ Review circumstance that caused lapse
- ✓ Develop new plan with patient

#### *Timing*

Contact soon after new quit date, preferably during the first week; further contacts as needed based on new quit plan

For information on smoking cessation programs, or to obtain a copy of a wallet card containing this information, call The Center for Tobacco Prevention and Control at 508-856-4099.

*Source: The Center for Tobacco Prevention and Control, Preventive and Behavioral Medicine, University of Massachusetts Medical School, in Partnership with the Massachusetts Tobacco Control Program.*

## Smoking Cessation Related Resources

### For clinicians:

QuitWorks [www.quitworks.org](http://www.quitworks.org)  
 American Lung Association [www.lungusa.org](http://www.lungusa.org)  
 Tobacco Cessation Guideline [www.surgeongeneral.gov/tobacco](http://www.surgeongeneral.gov/tobacco)  
 You Can Quit Smoking (Downloadable clinician tear sheet)  
 Treating Tobacco Use and Dependence, Quick Reference Guide (Downloadable tool for clinicians)

### For patients:

Try to Stop [www.trytostop.org](http://www.trytostop.org) 1-800-Try To Stop  
 English: 800-TRY-TO-STOP (800-879-8678)  
 Spanish and Portuguese: 800-8-DEJALO (800-833-5256)  
 TTY: 800-TDD-1477 (800-833-1477)  
 Quitnet [www.quitnet.org](http://www.quitnet.org)  
 Quit Smoking Support [www.quitsmokingsupport.com](http://www.quitsmokingsupport.com)

Psychosocial issues may prevent people with diabetes from adhering to the recommended medical regimen. Stressors such as family non-support, eating disorders, insufficient financial or social resources, and cognitive impairment may impact a patient's ability to carry out necessary diabetes care tasks. In addition to obtaining a history of previous psychiatric treatment, it is important in achieving optimal outcomes to provide timely identification of issues that may impact or be symptomatic of depression.

In particular, depression in people with diabetes requires careful management due to its severe impact on co-morbid conditions as well as on the individual's quality of life. Depression is known to affect glycemic control and micro/macrovascular complications. In addition, depressive symptoms play a more important role in mortality among people with diabetes than in those without. For adults with diabetes, the presence of two or more coexisting chronic conditions, particularly coronary artery disease, chronic arthritis, and stroke, increase the chances of developing major depression.

Compared to diabetic patients who are not depressed, those who are depressed require more costly care. These differences are partly related to non-adherence to medication regimens and worsened self-care skills. Depressive symptoms impact subsequent physical symptoms of poor glucose control by influencing patients' ability to adhere to their self-care regimen.

Although the primary clinician may not feel qualified to treat psychological problems, utilizing the patient-provider relationship as a foundation for further treatment can increase the likelihood that the patient will accept referral for other services.

### Screening

- It is important to include psychosocial evaluation as an integral component of the initial assessment for a patient with diabetes. Other opportunities for screening will occur during regularly scheduled management visits, as well as at times of medical status change such as the occurrence of a hospitalization, the development of a complication, or when problems with glucose control are identified.
- Screening should include but is not limited to: psychiatric history, affect/mood, quality of life attitudes, medical management expectations, availability of and ability to access financial, social, and emotional resources.
- Screening for depression, eating disorders, and cognitive impairment is needed when adherence to the medical regimen is poor.

### Recommendations

- Incorporate psychological screening and treatment into routine care rather than waiting for identification of a specific problem or deterioration in psychological status.
- Treat depression or refer to a mental health specialist for depression treatment.
- Immediately refer to a mental health specialist familiar with diabetes management if self harm or an eating disorder is suspected. A referral is also recommended if a problem is suspected to be organic in origin or when cognitive function is impaired.

*Source: American Diabetes Association. Standards of medical care. Diabetes Care 28 (Supplement 1), 2005.*

Diabetic retinopathy is estimated to be the most frequent cause of new cases of blindness among adults aged 20-74 years. The prevalence of retinopathy is strongly related to the duration of diabetes. Intensive diabetes management with the goal of achieving near normoglycemia has been shown to prevent and/or delay the onset of diabetic retinopathy. High blood pressure is an established risk factor for the development of macular edema and is linked to the presence of proliferative diabetic retinopathy. The presence of nephropathy is also associated with retinopathy. Patients with diabetic retinopathy or macular edema are often asymptomatic. Early diagnosis and prompt application of laser photocoagulation surgery is useful in preventing visual loss, but generally not beneficial in reversing already diminished acuity.

### Screening Recommendations

- An ophthalmologist or optometrist who is knowledgeable and experienced in diagnosing the presence of diabetic retinopathy and is aware of its management should perform comprehensive eye exams.
- Adults with type 1 diabetes should have an initial dilated and comprehensive eye examination within 5 years after the onset of diabetes.
- Patients with type 2 diabetes should have an initial dilated and comprehensive eye examination shortly following the diagnosis of diabetes.
- Subsequent examinations for type 1 and type 2 diabetic patients should be repeated annually.
- A qualified eye care professional may recommend less frequent exams (every 2-3 years) in the setting of a normal eye exam.
- Examinations will be required more frequently if retinopathy is progressing.
- Women with preexisting diabetes should have a comprehensive eye examination when planning pregnancy and should be counseled on the risk of development and/or progression of diabetic retinopathy.
- Women with diabetes who become pregnant should have a comprehensive eye examination in the first trimester and close follow-up throughout pregnancy and for 1 year postpartum.
- Retinal screening is not necessary for women who develop gestational diabetes because these women are not at increased risk for diabetic retinopathy.

### Treatment Recommendations

- Promptly refer patients with any level of macular edema, severe non-proliferative retinopathy, or any proliferative retinopathy to an ophthalmologist who is knowledgeable and experienced in the management and treatment of diabetic retinopathy.
- Laser therapy is known to reduce the risk of vision loss in patients with high-risk conditions, such as disc neovascularization or vitreous hemorrhage with any retinal neovascularization.

Source: American Diabetes Association (Position Statement). *Retinopathy in diabetes. Diabetes Care 27 (Supplement. 1): S84-S87, 2004.*

Periodontal disease is more common among people with diabetes. Young adults with diabetes have about twice the risk for periodontal disease than those without. Almost one-third of people with diabetes have severe periodontal disease with loss of attachment of the gums to the teeth measuring 5 millimeters or more. Periodontal disease progresses more rapidly, is often more aggressive, and difficult to treat in people with diabetes than in people without diabetes.

Defined as a bacterially induced chronic inflammatory process, periodontal disease destroys connective tissue and bone supporting the teeth, leading to tooth loss. Recent research suggests a bi-directional relationship between diabetes and periodontal disease in that people with diabetes are more susceptible, and the presence of periodontal disease can negatively impact glycemic control.

Symptoms of periodontal disease include red, swollen, tender, and bleeding gums, receding gums, evidence of pus upon gum compression, persistent bad breath, loose permanent teeth, change in bite, or change in the fit of dentures. Most individuals with diabetes do not have pain with periodontal disease and some may be asymptomatic.

Concurrent risk factors that increase the chances of developing periodontal disease include: disease duration, poor metabolic control, presence of other long-term complications, smoking, plaque, and hormonal variations as in adolescence, pregnancy, and menopause. Mouth care is often overlooked when managing the other issues associated with diabetes.

### Recommendations

- Conduct an oral exam as part of the yearly comprehensive visit.
- Advise patients of the importance of oral hygiene.
- Promptly refer patients with symptoms of periodontal disease for dental evaluation.
- Encourage patients to receive dental follow-up twice a year, and more often if necessary.

*Source: Loe H. Periodontal disease. The sixth complication of diabetes mellitus. Diabetes Care 16: 329-334, 1993.*

# MASSACHUSETTS GUIDELINES FOR ADULT DIABETES CARE

		Frequency	Description/Comments
<b>History &amp; Physical</b>	Blood pressure, Height and Weight	Every 3-6 months	If BP >130/80 initiate measures to lower
	Dilated Eye Exam	Annual <sup>1</sup>	Refer to ophthalmologist or optometrist
	Foot Exam	Every 3-6 months	Visual exam w/o shoes and socks every routine diabetes visit
	Comprehensive Lower Extremity Sensory Exam	Initial/Annual <sup>2</sup>	Teach protective foot behavior if sensation diminished. Refer to podiatrist if indicated. <i>See Foot Inspections and Monofilament Use Guide in packet</i>
	Dental Exam	Every 6 months	Refer to dentist
	Smoking Status	Ongoing	Check every visit/Encourage smoking cessation <i>See Smoking Intervention Model in packet</i>
<b>Labs</b>	A1C	Every 3-6 months <sup>3</sup>	Ideal goal <7.0% or <1% above lab norm <sup>4</sup> Action required at >8%, make changes in regime
	Fasting/Casual Blood Glucose	As indicated	Compare lab results with glucose self-monitoring
	Fasting Lipid Profile	Annual <sup>5</sup>	<i>See Cardiovascular Risk Reduction Guidelines in packet</i>
	Urine Microalbumin/Creatinine	Initial/Annual <sup>6,7</sup>	If abnormal, recheck x2 in a 3-month period, then treat if 2 out of 3 collections show elevated levels
	Serum Creatinine	Initial/As Indicated	
	EKG	Initial	If patient is >40 years old or DM ≥10 years
	Thyroid Assessment	Initial/As Indicated	Thyroid palpation, thyroid function test(s) if indicated
<b>Recommended Immunizations</b>	Flu	Every Fall	
	Pneumovax	Recommended once	Also revaccination x 1 if ≥65 and 1st vaccine >5 years ago <b>and</b> patient <65 at the time of 1st vaccine
<b>Self-Management</b>	Review Self-Management Skills	Initial/Ongoing	
	Review Treatment Plan	Initial/Ongoing	Check self-monitoring log book, diet, exercise, and meds
	Review Education Plan	Initial/Ongoing	Refer for Diabetes Self-Management Training if indicated
<b>Counseling</b>	Review Nutrition Plan	Initial/Ongoing	Refer for Medical Nutrition Therapy if indicated
	Review Physical Activity Plan	Initial/Ongoing	Assess/Prescribe based on patient's health status
	Tobacco use	Annual/Ongoing	Assess readiness/Counsel cessation/Refer to QuitWorks or other smoking cessation program
	Psychosocial Adjustment	Initial/Ongoing	Suggest diabetes support group/Counsel/Refer
	Sexuality/Impotence/Erectile Dysfunction	Annual/Ongoing	Discuss diagnostic evaluation and therapeutic options
	Preconception/Pregnancy	Initial/Ongoing	Need for tight glucose control 3-6 months preconception. Consider early referral to OB/GYN

<sup>1</sup> Type 1: Initial exam after 3-5 years disease duration. Type 2: Initial exam shortly after diagnosis.

<sup>2</sup> Every 3-6 months if patient has high-risk foot conditions.

<sup>3</sup> 2x/yr for stable glycemic control. 4x/yr if change in therapy or if not meeting glycemic goals.

<sup>4</sup> More stringent goals, including a normal A1C of <6% can be considered in individual patients and during pregnancy.

<sup>5</sup> If values fall in lower risk levels, assessment may be repeated every 2 years.

<sup>6</sup> Initial urinalysis at diagnosis of type 2 diabetes. For patients with type 1 diabetes, screen for microalbumin after 5 years of disease duration. Annual microalbumin thereafter.

<sup>7</sup> Type 1: Initial exam to begin with puberty and after 5 years disease duration.

These Guidelines are intended for community-dwelling adults. The Guidelines are not intended to replace the clinical judgement of health care providers.

FLOW SHEET FOR DIABETES CARE

**Visit Frequency: 2x/yr if meeting treatment goals, 4x/yr if not meeting treatment goals**

Patient		DOB		MR#				
Provider		Height						
Type of home glucose meter								
		Date	Date	Date	Date	Date	Date	
EVERY TIME	Diabetes Medications & Doses (Insulin and/or Oral Agent)							
	ASA Therapy <sup>1</sup>							
	ACE inhibitor or ARB, if indicated <sup>2</sup>							
	Weight:							
	BMI: Goal BMI <25							
	BP: Goal <130/80		Value					
	A1C every 3-6 months: Target <7%		Value					
	Fasting/Random Glucose: Goal 90-130 $\bar{a}$ , < 180 1-2 hrs $\bar{p}$		Value					
	Review Blood Glucose Records		✓ when done					
	Smoking Cessation Counseling		✓ when done					
	Foot Exam		✓ when done					
	Psychosocial Assessment as needed		✓ when done					
YEARLY	Flu Vaccine		Date					
	Microalbumin <sup>3</sup>		Date					
	Dilated Eye Exam		Date					
	Fasting Lipid Profile <sup>4</sup>		LDL (goal <100)	Date/Values				
			HDL (men, goal >40; women, goal >50)					
			Triglycerides (goal <150)					
			Total cholesterol (goal <135)					
	Creatinine (as indicated)		Date/Value					
	Comprehensive Lower Extremity Exam <sup>5</sup>		Date					
	Diabetes Education Referral		Date					
	Diabetes Nutrition Referral		Date					
	ONCE	Dental Exam (x2)		Date				
Pneumovax		Date						
EKG: if >40 years and/or DM ≥10 years		Date						

<sup>1</sup>There continues to be controversy in the literature regarding the interaction between aspirin therapy and ACE inhibitors.

<sup>2</sup>See discussion under CVD, HTN and Nephropathy.

<sup>3</sup>Initial urinalysis at diagnosis, annual microalbumin thereafter. See discussion under Nephropathy.

<sup>4</sup>Fasting Lipid Profile every 2 years if values fall in lower risk levels.

<sup>5</sup>Comprehensive LEE every 3-6 months if patient has high-risk foot conditions.

## DETERMINING BODY MASS INDEX FROM HEIGHT AND WEIGHT

Body Mass Index (kg/m <sup>2</sup> )		19	20	21	22	23	24	25	26	27	28	29	30	35	40					
		Height (in.)																		
Height (in.)	Body Weight (lb.)																			
	58	91	96	100	105	110	115	119	124	129	134	138	143	148	153	158	167	173	179	185
59	94	99	104	109	114	119	124	128	133	138	143	148	153	158	164	169	174	179	185	191
60	97	102	107	112	118	123	128	133	138	143	148	153	158	164	169	174	179	185	191	197
61	100	106	111	116	122	127	132	137	143	148	153	158	163	169	174	179	185	191	197	204
62	104	109	115	120	126	131	136	142	147	153	158	163	169	174	179	185	191	197	204	211
63	107	113	118	124	130	135	141	146	152	158	163	169	174	179	185	191	197	204	211	218
64	110	116	122	128	134	140	145	151	157	163	169	174	179	185	191	197	204	211	218	225
65	114	120	126	132	138	144	150	156	162	168	174	179	185	191	197	204	211	218	225	232
66	118	124	130	136	142	148	155	161	167	173	179	185	191	197	204	211	218	225	232	240
67	121	127	134	140	146	153	159	166	172	178	185	191	197	204	211	218	225	232	240	247
68	125	131	138	144	151	158	164	171	177	184	190	197	204	211	218	225	232	240	247	255
69	128	135	142	149	155	162	169	176	182	189	196	203	210	217	224	231	238	245	252	260
70	132	139	146	153	160	167	174	181	188	195	202	209	216	223	230	237	244	251	258	266
71	136	143	150	157	165	172	179	186	193	200	208	215	222	229	236	243	250	257	264	272
72	140	147	154	162	169	177	184	191	199	206	213	221	228	235	242	249	256	263	270	278
73	144	151	159	166	174	182	189	197	204	212	219	227	234	241	248	255	262	269	276	284
74	148	155	163	171	179	186	194	202	210	218	225	233	240	247	254	261	268	275	282	290
75	152	160	168	176	184	192	200	208	216	224	232	240	247	254	261	268	275	282	289	297
76	156	164	172	180	189	197	205	213	221	230	238	246	254	261	268	275	282	289	296	304

### Classification of Overweight and Obesity by BMI, Waist Circumference, and Associated Disease Risk\*

Disease Risk* Relative to Normal Weight & Waist Circumference				
	BMI (kg/m <sup>2</sup> )	Obesity Class	Men: ≤102 cm (≤40 in) Women: ≤88 cm (≤35 in)	Men: >102 cm (>40 in) Women: >88 cm (>35 in)
Underweight	<18.5			
Normal	18.5-24.9			
Overweight	25.0-29.9		Increased	High
Obesity	30.0-34.9	I	High	Very High
	35.0-39.9	II	Very High	Very High
Extreme Obesity	≥40	III	Extremely High	Extremely High

\*Disease risk for type 2 diabetes, hypertension, and cardiovascular disease.

Source: National Institutes of Health, National Heart, Lung and Blood Institute. Clinical guidelines on the identification, evaluation, and treatment of overweight and obesity in adults, 1998.

American Diabetes Association. (2005). Standards of Medical Care. *Diabetes Care* 28 (Supplement 1).

Refer also to specific Guidelines pages for additional citations.

### Screening and Diagnosis

Expert Committee on the Diagnosis and Classification of Diabetes Mellitus. (1997). Report of the expert committee on the diagnosis and classification of diabetes mellitus. *Diabetes Care* 20, 1183-197.

Expert Committee on the Diagnosis and Classification of Diabetes Mellitus. (2003). Follow-up report on the diagnosis of diabetes mellitus. *Diabetes Care* 26, 3160-3167.

American Diabetes Association. Tests of glycemia in diabetes. (2004). *Diabetes Care* 27 (Supplement 1), S91-S93.

National Institutes of Health, National Heart, Lung and Blood Institute. (2000). The practical guide, identification, evaluation, and treatment of overweight and obesity in adults.

### Prevention or Delay of Diabetes

The Diabetes Prevention Program Research Group. (2005). Strategies to identify adults at high risk for type 2 diabetes. *Diabetes Care* 28, 138-144.

Herman W, et. al. for the Diabetes Prevention Program Research Group. (2005). The cost-effectiveness of lifestyle modification or metformin in preventing type 2 diabetes in adults with impaired glucose tolerance. *Ann Intern Med* 142, 323-332.

Kanaya A, et. al. (2005). Predicting the development of diabetes in older adults: The derivation and validation of a prediction rule. *Diabetes Care* 28, 404-408.

Laaksonen D, et. al., for the Finnish Diabetes Prevention Study Group. (2005). Physical activity in the prevention of type 2 diabetes. *Diabetes* 54, 158-165.

McNeely M, Boyko E. (2004). Type 2 diabetes prevalence in Asian Americans. Results of a national health survey. *Diabetes Care* 27, 66-69.

Skyler J. (2004). Effects of glycemic control on diabetes complications and on the prevention of diabetes. *Clinical Diabetes*, 22, 162-166.

### Glycemic Control

American Diabetes Association. (2003). Position statement. Implications of the United Kingdom prospective diabetes study. *Diabetes Care* 26 (Supplement 1), S28-S32.

Rohlfing C, Wiedmeyer H, Little R, England J, Tennill A, Goldstein D. (2002). Defining the relationship between plasma glucose and HbA1c: Analysis of glucose profiles and HbA1c in the diabetes control and complications trial. *Diabetes Care* 25, 275-278.

Diabetes Control and Complications Trial Research Group. (1993). The effect of intensive treatment of diabetes on the development and progression of long-term complications in insulin-dependent diabetes mellitus. *N Engl J Med* 329, 977-986.

Nathan, D.M. (2002). Initial management of glycemia in type 2 diabetes mellitus. *N Engl J Med* 347, 1342-1349.

### Nutrition

American Diabetes Association. (2005). Position statement. Standards of medical care in diabetes. *Diabetes Care* 28 (Supplement 1), S11-S14.

American Diabetes Association. (2003). Position statement. Evidence based nutrition principles and recommendations for the treatment and prevention of diabetes and related complications. *Diabetes Care* 26 (Supplement 1), S51-S61.

American Diabetes Association. (2004). Nutrition principles and recommendations in diabetes. *Diabetes Care* 27 (Supplement 1), S36-S46.

Sheard N, Clark N, Brand-Miller J, Franz M, Pi-Sunyer F, Mayer-Davis E, Kulkarni K, Geil P. (2004). A statement of the American Diabetes Association. Dietary carbohydrate (amount and type) in the prevention and management of diabetes. *Diabetes Care* 27, 2266-2271.

Klein S, Sheard N, Pi-Sunyer X, Daly A, Wylie-Rosett J, Kulkarni K, Clark N. (2004). A statement of the American Diabetes Association, the North American Association for the Study of Obesity, and the American Society for Clinical Nutrition. Weight management through lifestyle modification for the prevention and management of type 2 diabetes: Rationale and strategies. *Diabetes Care* 27, 2067-2073.

American Dietetic Association. Diabetes medical nutrition therapy. (1997). Chicago, IL: American Dietetic Association.

American Dietetic Association. Nutrition practice guidelines for type I and type II diabetes. (1996). Chicago, IL: American Dietetic Association.

### Exercise

American Diabetes Association. (2003). Position statement. Diabetes mellitus and exercise. *Diabetes Care* 26 (Supplement 1), S49-53.

American Diabetes Association. The health professional's guide to diabetes and exercise. (1995). Alexandria, VA: American Diabetes Association, Inc.

Ross R. (2003). Does exercise without weight loss improve insulin sensitivity? *Diabetes Care* 26, 944-945.

(continued on reverse)

Sigal R, Kenny G, Wasserman D, Castaneda-Sceppa. (2004). Physical activity/exercise and type 2 diabetes. *Diabetes Care* 27, 2518-2539.

Zacker R. (2004). Exercise: A key component of diabetes management. *Diabetes Spectr* 17, 142-144.

### Medications

American Diabetes Association. (2003). Position statement. Insulin administration. *Diabetes Care* 26 (Supplement 1), S121-S124.

Amylin Pharmaceuticals, Inc. Prescribing information for exenitide (Byetta). April 2005.

Bayer Corporation. Prescribing information for acarbose (Precose). November 2004.

Bristol-Myers Squibb Co. Prescribing information for metformin (Glucophage). March 2004.

Bristol-Myers Squibb Co. Prescribing information for glyburide and metformin (Glucovance). March 2004.

Bristol-Myers Squibb Co. Prescribing information for glipizide and metformin (Metaglip). October 2002.

Edwards G, Urquhart R, Moules I, et al. (2004). Two-year efficacy of pioglitazone versus gliclazide addition to metformin therapy in T2DM. *Diabetes* 53 (Supplement 2), A475.

Eli Lilly and Company. Prescribing information for insulin lispro protamine/insulin lispro mix (Humalog 75/25). August 2004.

GlaxoSmithKline. Prescribing information for rosiglitazone (Avandia). March 2005.

GlaxoSmithKline. Prescribing information for rosiglitazone and metformin (Avandamet). January 2005.

Hanfield MM, Brunetti P, Scherthamer GH, et al. (2004). One-year glycemic control with a sulfonylurea plus pioglitazone versus a sulfonylurea plus metformin in patients with type 2 diabetes. *Diabetes Care* 27, 141-147.

Hirsch B. (2005). Insulin analogues. *N Engl J Med*, 352(2), 174-183.

Kimmel B, Inzucchi S. (2005). Oral agents for type 2 diabetes: An update. *Clinical Diabetes* 23, 64-76.

Mariz S, Urquhart R, Moules I, et al. (2004). Effects of pioglitazone addition to metformin or sulfonylurea therapy on serum lipids in patients with T2DM; 2-year data. *Diabetes* 53 (Supplement 2), A137.

Moules I, Edwards G, Mariz S, et al. (2004). Two-year efficacy of the addition of pioglitazone to sulfonylurea therapy in patients with T2DM. *Diabetes* 53 (Supplement 2), A139.

Novartis Pharmaceuticals Corporation. Prescribing information for nateglinide (Starlix). January 2004.

Novo Nordisk Pharmaceuticals, Inc. Prescribing information for repaglinide (Prandin). December 2004.

Novo Nordisk Pharmaceuticals, Inc. Prescribing information for insulin aspart protamine/insulin aspart mix (NovoLog 70/30). October 2004.

Pharmacia & Upjohn Co. Prescribing information for miglitol (Glyset). October 2004.

Raskin P, Allen E, Hollander P, Lewin A, Gabbay R A, Hu P, Bode B, Garber A, for the INITIATE Study Group. (2005). Initiating insulin therapy in type 2 diabetes: A comparison of biphasic and basal insulin analogs. *Diabetes Care* 28, 260-265.

Rosenstock J, Goldstein BJ, Wooddell MJ, et al. (2004). Greater benefits of rosiglitazone added to submaximal dose of metformin compared to maximizing metformin dose in type 2 diabetes mellitus patients. *Diabetes* 53 (Supplement 2), A144.

Takeda Pharmaceuticals America, Inc. Prescribing information for pioglitazone (Actos). August 2004.

Weissman PN, Goldstein BJ, Campbell JC, et al. (2004). Rosiglitazone plus metformin combination effects on CV risk markers suggest potential CV benefits in type 2 diabetic patients. *Diabetes* 53 (Supplement 2), A28.

### Diabetes Self-Management Training

American Association of Diabetes Educators. A core curriculum for diabetes education. (2003), Fifth Edition. Chicago, IL: American Association of Diabetes Educators.

American Diabetes Association. Medical management of type 1 diabetes. (2003), Fourth Edition. Alexandria, VA: American Diabetes Association, Inc.

American Diabetes Association. Medical management of type 2 diabetes. (2004), Fifth Edition. Alexandria, VA: American Diabetes Association, Inc.

American Diabetes Association. (2005). National standards for diabetes self-management education. *Diabetes Care* 28 (Supplement 1), S72-S79.

Norris, S. (2003). Self-management education in type 2 diabetes: What works? *Practical Diabetology*, 7-13.

Siminerio S, McLaughlin S, Polonsky W. (2003). Diabetes education goals. American Diabetes Association, Inc.

### Complications

#### Cardiovascular Disease

American Diabetes Association. (2004). Position Statement. Dyslipidemia management in adults with diabetes. *Diabetes Care* 27 (Supplement 1), S68-S71.

(continued on next page)

- Colhoun H, Betteridge D, Durrington P, Hitman G, Neil H, Livingstone S, Thomason M, Mackness M, Charlton-Menys V, Fuller J. (2004). Primary prevention of cardiovascular disease with atorvastatin in type 2 diabetes in the Collaborative Atorvastatin Diabetes Study (CARDS): Multicentre randomised placebo-controlled trial. *Lancet* 364, 685-696.
- Frishman, W. et al. (2003). Drug treatment of orthostatic hypotension and vasovagal response. *Heart Disease* 5(1), 49-64.
- Grundy S, Cleeman J, Merz C, Brewer H, Clark L, Hunninghake D, Pasternak R, Smith S, Stone N. (2004). Implications of recent clinical trials for the national cholesterol education program adult treatment panel III. *Circulation* 110, 237-239.
- Gæde et al. (2003). Multifactorial intervention and cardiovascular disease in patients with type 2 diabetes. *N Engl J Med*, 348(5), 383-393.
- Heart Protection Study Collaborative Group. (2003). MRC/BHF heart protection study of cholesterol-lowering with simvastatin in 5963 people with diabetes: A randomized placebo-controlled trial. *Lancet* 361, 2005-2016.
- Krumholz, H, Chen Y, Wang Y, Radford M. (2001). Aspirin and angiotensin-converting-enzyme inhibitors among elderly survivors of hospitalization for acute myocardial infarction. *Arch Intern Med* 161, 538-544.
- Nissen S, et al. (2004). Effect of intensive compared with moderate lipid-lowering therapy on progression of coronary atherosclerosis. *JAMA*, 291, 1071-1080.
- Peterson JG, et al. (2000). Evaluation of the effects of aspirin combined with angiotensin-converting-enzyme inhibitors in patients with coronary artery disease. *Am J Med*, 371-377.
- Savage, P. (1996). Cardiovascular complications of diabetes mellitus: What we know and what we need to know about their prevention. *Ann Intern Med* 124 (1 pt 2), 123-126.
- Selvin E, Marinopoulos S, Berkenblit G, Rami T, Brancati F, Powe N, Golden S. (2004). Meta-analysis: Glycosylated hemoglobin and cardiovascular disease in diabetes mellitus. *Ann Intern Med* 141, 421-431.
- U.S. Preventative Services Task Force. (2004). Recommendation statement. Screening for coronary heart disease. *Ann Intern Med* 140, 569-572.
- Wackers F, Young L, Inzucchi S, Chyun D, Davey J, Barrett E, Taillefer R, Wittlin S, Heller G, Filipchuk N, Engel S, Ratner R, Iskandrian A. (2004). Detection of silent myocardial ischemia in asymptomatic diabetic subjects. The DIAD study. *Diabetes Care* 27, 1954-1961.
- Foot Problems**
- American Diabetes Association. (1999). Consensus development conference on diabetic foot wound care. Boston, Massachusetts. *Diabetes Care* 22, 1354-1360.
- American Diabetes Association. (2003). Consensus statement. Peripheral arterial disease in people with diabetes. *Diabetes Care* 26, 3333-3341.
- American Diabetes Association. (2004). Position statement. Preventive foot care in people with diabetes. *Diabetes Care* 27 (Supplement 1), S63-S64.
- Levin, M. E. (1995). Preventing amputation in the patient with diabetes. *Diabetes Care* 18(10), 1383-1394.
- National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases. (1998). Feet can last a lifetime: A health care provider's guide to preventing diabetes foot problems.
- Reiber, G.E., Boyko, E.J., and Smith, D. (1995). *Lower extremity foot ulcers and amputations in diabetes*. In NIH. *Diabetes in America, 2nd Edition*. Publication No. 95-1468, (pp. 409-428).
- Hypertension**
- Bell, D. (2003). Beta-blockers in the diabetic patient. *Practical Diabetology*, 20-23.
- Pepine CJ et al. (2003). A calcium agonist vs a non-calcium agonist hypertension treatment strategy for patients with coronary artery disease. *JAMA* 290, 2805-2816.
- Psaty BM, Lumley T, Furberg CD, Schellenbaum G, Pahor M, Alderman MH, et al. (2003). Health outcomes associated with various antihypertensive therapies used as first-line agents: A network meta-analysis. *JAMA* 289, 2534-44.
- Nephropathy**
- American Diabetes Association. (2004). Position Statement. Nephropathy in diabetes. *Diabetes Care* 27 (Supplement 1), S79-S83.
- Barnett AH, Bain SC, Bouter P, Karlberg B, Madsbad S, Jervell J, Mustonen J. (2004). Angiotensin-receptor blockade versus converting-enzyme inhibition in type 2 diabetes and nephropathy. *N Engl J Med* 351, 1952-1961.
- Berl T et al. (2003). Cardiovascular outcomes in the irbesartan diabetic nephropathy trial of patients with type 2 diabetes and overt nephropathy. *Ann Intern Med* 138, 542-549.
- Eknoyan G, Hostetter T, Bakris GL, Hebert L, Levey AS, Parving HH, Steffes MW, Toto R. (2003). Proteinuria and other markers of chronic kidney disease: A position statement of the National Kidney Foundation and the National Institute of Diabetes and Digestive and Kidney Diseases. *Am J Kidney Dis* 42, 617-622.
- K/DOQI clinical practice guidelines for chronic kidney disease: Evaluation, classification, and stratification. (2002). *Am J Kidney Dis* 39, S1-S266.

(continued on reverse)

Klausen K, Borch-Johnsen K, Feldt-Rasmussen B, Jensen G, Clausen P, Scharling H, Appleyard M, Jensen JS. (2004). Very low levels of microalbuminuria are associated with increased risk of coronary heart disease and death independently of renal function, hypertension, and diabetes. *Circulation* 110, 32-35.

Ruggenenti P et al. (2004). Preventing microalbuminuria in type 2 diabetes. *N Engl J Med* 351, 1941-1951.

### Periodontal Disease

American Academy of Periodontology. (2000). Position Statement. Diabetes and Periodontal Diseases. *J Periodontol* 71, 664-678.

Grossi S, Skrepcinski F, DeCaro T, Robertson D, Ho A, Dunford R. (1997). Treatment of periodontal disease in diabetics reduces glycated hemoglobin. *J Periodontol* 68 (8), 713-9.

Katz P, Wirthlin M, Szpunar S, Selby J, Sepe S, Showstack J. (1991). Epidemiology and prevention of periodontal disease in individuals with diabetes. *Diabetes Care* 14, 375-385.

Loe H, Periodontal disease. (1993). The sixth complication of diabetes mellitus. *Diabetes Care* 16, 329-334.

National Institute of Diabetes and Digestive and Kidney Diseases. (December 2004). *Diabetes statistics*. Bethesda, MD: National Institutes of Health. NIH Publication No. 05-3892.

Ryan M. (2003). The influence of diabetes on periodontal tissues. *JADA* 134, 345-405.

Taylor GW. (2001). Bidirectional interrelationships between diabetes and periodontal diseases: An epidemiologic perspective. *Ann Periodontol* 6(1), 99-112.

U.S. Department of Health and Human Services. (2000). Oral health in America: A report of the Surgeon General. Rockville, MD: U.S. Department of Health and Human Services, National Institutes of Health, National Institute of Dental and Craniofacial Research.

### Psychosocial Issues

Egede L. (2005). Effect of comorbid chronic diseases on prevalence and odds of depression in adults with diabetes. *Psychosomatic Medicine* 67, 46-51.

Gilmer T, O'Connor P, Rush W, Crain L, Whitebird R, Hanson A, Solberg L. (2005). Predictors of health care costs in adults with diabetes. *Diabetes Care*, 28, 59-63.

Goldney R, Phillips M, Fisher L, Wilson D. (2004). Diabetes, depression, and quality of life. *Diabetes Care* 27, 1066-1070.

Jacobson A. (1993). Depression and diabetes. *Diabetes Care* 16, 1621-1623.

Leichter S, See Y. (2005). Problems that extend visit time and cost in diabetes care: How depression may affect the efficacy and cost of care of diabetic patients. *Clinical Diabetes* 23, 53-54.

Lin E, Katon W, Von Korff M, Rutter C, Simon G, Oliver M, Ciechanowski P, Ludman E, Bush T, Young B. (2004). Relationship of depression and diabetes self-care, medication adherence, and preventive care. *Diabetes Care* 27, 2154-2160.

McKellar J, Humphreys K, Piette J. (2004). Depression increases diabetes symptoms by complicating patients' self-care adherence. *Diabetes Educ* 30, 485-492.

Zhang X, Norris S, Gregg E, Cheng Y, Beckles G, Kahn H. (2005). Depressive symptoms among persons with and without diabetes. *Am J Epidem* 161, 652-660.

### Retinopathy

American Diabetes Association. (2004). Position Statement. Retinopathy in diabetes. *Diabetes Care* 27 (Supplement 1), S84-S87.

The Diabetes Control and Complications Trial Research Group: Effect of pregnancy on microvascular complications in the diabetes control and complications trial. (2000). *Diabetes Care* 23, 1084-1091.

Fong DS, Aiello LP, Ferris FL, Klein R. (2004). Diabetic retinopathy (Technical Review). *Diabetes Care* 27: 2540-2553.

### Smoking

American Diabetes Association. (2004). Position Statement. Smoking and diabetes. *Diabetes Care* 27 (Supplement. 1): S74-S75.

Fiore MC, Bailey WC, Cohen SJ, et. al. (2000). *Treating Tobacco Use and Dependence*. Quick Reference Guide for Clinicians. Rockville, MD: U.S. Department of Health and Human Services. Public Health Service.

Haire-Joshu D, Glasgow R, Tibbs T. (1999). Smoking and diabetes. *Diabetes Care* 22:11, 1887-1898.

### Pregnancy

American Diabetes Association. (2004). Position Statement. Gestational diabetes mellitus. *Diabetes Care* 27 (Supplement 1), S88-S90.

### Other

National Institute of Diabetes and Digestive and Kidney Diseases. (2004). National diabetes statistics fact sheet. General information and national estimates on diabetes in the United States. NIH Publication No. 05-3892.

Diabetes Prevention and Control Program, Massachusetts Department of Public Health. (2003). Data supplement. Health of Massachusetts: Impact of diabetes.

American Diabetes Association. (2003). Position statement. Immunization and the prevention of influenza and pneumococcal disease in people with diabetes. *Diabetes Care* 26 (Supplement 1), S126-S128.

# CLEARINGHOUSE

The following health promotion materials on diabetes are free of charge and available in bulk quantities. To order, please complete the order form on the reverse side.

## DIABETES

**Massachusetts Guidelines for Adult Diabetes packet**  
For health care professionals only. Summarizes essential components of sound diabetes management. Includes diabetes-related resources for use in the primary care setting. Developed by the Diabetes Guidelines Work Group and the Massachusetts Diabetes Prevention and Control Program of the Massachusetts Department of Public Health. Revised 2005/ 8-1/2"x11"/ 26 pp/ 3-hole punched/ shrink-wrapped/ English (#DB723) limit of 5

**Diabetes Care Card**  
For adults with diabetes. Helps people with diabetes to maintain records of medical tests and identify personal goals. Provides space to list medication and contact information for health care professionals. 2-3/4"x4-1/2"/ 4-panel/ English (#DB720), Chinese (#DB737), Khmer (#DB738), Portuguese (#DB731), Spanish (#DB730), Vietnamese (#DB739)

**Massachusetts Guidelines for Adult Diabetes Care laminated summary**  
For health care professionals only. Wall chart highlights essential components of quality diabetes management. Revised 2005/ 8-1/2"x11"/ English (#DB721) limit of 10

**Diabetes Fact Sheets**  
For adults with diabetes. Bilingual fact sheets set shares information and resources on diabetes management (What Is Diabetes?; Do I Have Diabetes?; What Can I Do to Stay Healthy?; Low Blood Sugar, High Blood Sugar, and Sick Days; What is the Hemoglobin A1c Test?). 8-1/2" x 11"/ 5 sheets/ reproducible/ double-sided/ English/Spanish (#DB729) limit of 1 set

**Tips for Kids With Type 2 Diabetes tip sheets**  
For children with type 2 diabetes and their families. Tip sheets set, including: What is Diabetes?; Stay at a Healthy Weight; Be Active; and, Eat Healthy Foods. Follows a simple Q&A format, defines basic medical terms associated with diabetes, and helps children understand how to manage the condition. 8-1/2"x11"/ 4 sheets/ reproducible/ English (#DB781) limit of 1 set

**Diabetes: Are You at Risk? brochure**  
For health care professionals (for use with patients). Describes type 1 and type 2 diabetes, risks for diabetes, and symptoms. Includes space for health care professionals to record blood glucose screening results and recommendations for follow-up. 3-3/4"x 8-1/2"/ 3-fold/ English (#DB701), Chinese (#DB758), Haitian Creole (#DB702), Khmer (#DB759), Portuguese (#DB760), Spanish (#DB703), Vietnamese (#DB761)

**Diabetes Can Harm Your Vision brochure**  
For adults with diabetes. Features two people with diabetes who encourage the reader to have an annual eye examination. Presents facts about diabetes and eye disease. Large type. 3-3/4"x8-1/2"/ 4-fold/ English (#DB704), Haitian Creole (#DB705), Portuguese (#DB757), Spanish (#DB706)

**If You Have Diabetes, A Flu Shot Could Save Your Life poster**  
For adults with diabetes. Emphasizes the importance of flu shots for people with diabetes. 18"x22"/ English (#DB718), Spanish (#DB722)

**Diabetes and Your Feet brochure**  
For adults with diabetes. Provides information about foot injuries that can be caused by diabetes. Describes symptoms and provides instructions for preventive foot care. 3-3/4"x8-1/2"/ 3-fold/ English (#DB707), Haitian Creole (#DB708), Portuguese (#DB756), Spanish (#DB709)

**Know Your Blood Sugar Numbers... brochure**  
For adults with diabetes. Emphasizes the importance of blood sugar control and describes two important tests (HbA1c and finger stick blood glucose) that tell if blood sugar is at a healthy level. A checklist helps remind people of important tests and services they need. 3-3/4"x8-1/2"/ 3-fold/ English (#DB726), Chinese (#DB734), Khmer (#DB735), Portuguese (#DB754), Spanish (#DB727), Vietnamese (#DB736)

**If You Have Diabetes, Know Your Cholesterol Numbers brochure**  
For adults with diabetes. Describes the links between diabetes and cardiovascular disease and emphasizes the importance of maintaining healthy cholesterol levels. Provides space to record your own cholesterol numbers. 3-3/4"x8-1/2"/ 3-fold/ English (#DB750), Portuguese (#DB755), Spanish (#DB751)

**Easy Eating for Busy People brochure**  
For adults with diabetes. Emphasizes the importance of a balanced diet in diabetes management. Describes food groups using examples and demonstrates how to balance a meal. Includes sample daily menu and additional tips for diabetes control. Spanish version includes culturally appropriate photos and foods. 3-3/4"x8-1/2"/ 4-fold/ English (#DB752), Spanish (#DB753)

**Diabetes in the Elderly: A Workshop for Senior Service Providers curriculum**  
For health care professionals only. Six-hour curriculum covers medical aspects of diabetes, role of physical activity, medical nutrition therapy, psychosocial factors. 8-1/2"x11"/ 41 pp/ shrink-wrapped/ English (#DB711)

**Diabetes Help-Finder Resource Directory**  
For people with diabetes. Offers basic information on all aspects of diabetes as well as resources to help manage living with this chronic disease. The first part of this directory contains educational information. The second half is set up like the yellow pages of a telephone book to provide easy access to information on services and supplies for people with diabetes. 8-1/2"x11"/ 122 pp/ 3-hole punched/ shrink wrapped/ English (#DB714) limit of 1

**The Health of Massachusetts: Impact of Diabetes report**  
For public health professionals, community-based organizations, and health care providers. This 45 page report presents a comprehensive picture of the scope and impact of diabetes in the state of Massachusetts. It includes telling statistics on disease prevalence and health care costs along with what is known about the disease and how to prevent it. 8-1/2"x11"/ 45 pp/ English (#DB776) limit of 1



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